1859 PUBLISHED WEEKLY 1920

MANUFACTURING. DISTRIBUTION

AMERICAN GAS ENGINEERING JOURNAL

COMMERCIAL INDUSTRIAL

FORMERLY

AMERICAN GAS LIGHT JOURNAL

VOL. CXIII., No. 20
WHOLE No. 3271

NEW YORK, SATURDAY, NOVEMBER 13, 1920

Subscription $3 per year
$4 Canada $5 Foreign

Library of Congress
Smithsonian Deposit

Koppers Triangular Flued Combination Coke and Gas Ovens

have many advantages over other methods for the manufacture of coal gas.

The quality of the gas produced will meet any standard requirements for coal gas.

The coke is of superior quality, resulting in a wider market and better prices.

The by-product recovery shows:

(a) A greater yield of ammonia from the same coal.
(b) A better quality of tar.
(c) A greater yield of benzols.

The coal and coke are handled mechanically in bulk. This results in labor economy as compared with gas retort operation, which, in many cases, requires much hand labor of a particularly arduous and unpleasant character. Where handling machinery and other labor-saving devices are installed in the retort house, the items of interest, depreciation, and repairs are excessive in proportion to the tonnage handled.

The plant is more compact and occupies less ground space than the best designed retort plant of equal capacity.

The heating efficiency is greater.

The life of the plant is longer and repair charges are less.

More flexible operation due to arrangement for heating any number or all of the ovens with either coke oven gas or producer gas.

We are prepared to build plants with outputs ranging from 500,000 cubic feet of gas per day to 100,000,000 cubic feet per day.

THE KOPPERS COMPANY

PITTSBURGH, PA.

INDEX TO CONTENTS, PAGE 399 ADVERTISERS' INDEX, PAGE 46

Useless Investigations

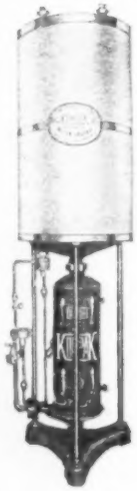
Is the street main large enough?
Is the house service large enough?
Is the gas meter large enough?
Is the flue opening large enough?
Is the water pressure high enough?

All these conditions need not be investigated when selling a Kompak Automatic Water Heater.

Where There's GAS

You can always install a

KOMPAK



THE KOMPAK COMPANY

New Brunswick - - - New Jersey

C. B. BABCOCK COMPANY

768 Mission Street, San Francisco, Cal.

Pacific Coast Representative

M126

AMERICAN GAS ENGINEERING JOURNAL. Nov. 13, 1920. Vol. CXIII, No. 20. Published Weekly by American Gas Light Journal, Inc., New York, N. Y. Subscription Price $3 per Year; $4 Canada; $5 Foreign.
Entered as second-class matter January 9, 1917, at the post-office at New York, N. Y., under the Act of March 3, 1879.

American
Gas Engineering Journal

FORMERLY THE AMERICAN GAS LIGHT JOURNAL

Vol. CXIII, No. 20 NEW YORK, NOVEMBER 13, 1920 Whole No. 3271

Central Gas Appliance Testing Laboratory Idea Eminently Correct and if Properly Handled Can Be Made to Function Successfully from the Start

Its Responsibilities as to Research Will Not Tend to Socialize Gas Appliance Manufacturing Business, but Rather Will Stimulate Invention and Bring About Improvements Urgently Needed

By H. M. RILEY

The suggestions and ideas comprising this article have been culled from a more or less intimate contact with testing laboratory practice for upwards of ten years and though some of the points might have a tinge of personal bias it is thought advisable to make mention of them and their bearing on the question at hand.

A rather brief survey of the history of testing laboratories discloses that, as an active branch of gas engineering work, this line of endeavor is probably not much over a dozen years old. Undoubtedly almost since the start of the industry a century ago various gas consuming appliances were subjected from time to time to investigation of a rather unstandardized nature which possibly with the exception of lighting units did not lead to anything of worth-while value. This condition of affairs is remarkable if not deplorable when we stop to reflect on what our friends in the electric industry have been doing in this direction. Howbeit, the gas industry has reason to feel rather "cocky" at the progress made during the last ten or twelve years as regards the proper testing and developing of useful and dependable appliances for its customers. Even so, there are probably only a half dozen or so gas company laboratories at the present time operating as integral parts of their separate companies. We might digress for the moment and speculate as to why this number is so small in comparison to the many gas companies now in successful operation in this country.

Several reasons might be advanced, viz.:

1. Comparatively high expense of maintaining a laboratory.
2. Ignorance as to the value of a laboratory or data.
3. Dependence on other outside sources for data and information.
4. Indifference and don't-care spirit.
5. Erroneous idea that the laboratory does not convey desired data.

The first reason is worthy of some serious consideration and will be dealt with in detail later on. Number two suggests same faulty headwork and education, all other things being equal.

The third item might be best described by using a stock slang expression, "Let George do it," and the last might start a fair-sized argument, while the fourth is hardly worth discussing.

At all events the small number of laboratories and the reasons advanced for this state of affairs form a logical step toward discussing the desirability and feasibility of a central testing laboratory.

Naturally it would seem that the primary object of the work carried out in the laboratory would be to furnish simple and definite data to gas companies as to the performance and characteristics of various gas consuming devices and appliances. Also to develop new methods and appliances for the correct and efficient use of gas. The foregoing is of course based on the assumption that the laboratory in question will be exclusively a utilization proposition.

As stated, the electrical industry has had such laboratories in operation for quite some years and their worth and usefulness have been proven many times over. This fact in itself almost completely ensures that such a laboratory would be advisable in the gas industry so that the problem would seem to resolve itself into a question of the ways and means of carrying on the same.

Let us discuss, then, as a starting point, the most important feature of the laboratory, viz., the qualifications desired and necessary in the men turning out the work.

Personnel

One of the great drawbacks or hindrance to the engineering profession has been that anyone via the brains, brawn or bluff route can dabble in the work without requiring a college degree or any legal sanction as in the case of the law and medicine. The fascinating lure of

the beaker, transit and slide rule has drawn into all industries that are largely dependent upon engineering principles for their operation, a mass of pseudo engineers who are performing their daily tasks by rote. In other words, our industry together with others has as a natural process accumulated in its ranks a number of practical, rule-of-thumb men practising at engineering. Granted in some cases these individuals have been highly successful, after all the proposition has been rather well analyzed by Dr. Richards, the eminent metallurgist, in the following words: "It is well to be successful, but it is better to be intelligently so." As an average proposition, then, it would seem to be a fundamental error to place in charge of the laboratory any other than a graduate technical man, and according to the writer's notion he should have a good foundation in the fundamentals of general chemistry. At the same time, a thorough grounding in drawing and mechanical subjects would appear to be highly advisable. The one who measures up to these requirements is the chemical engineer. That is, a man who has pursued and completed a course in chemical engineering at a recognized technical college.

It is a safe assumption that for the most part the laboratory will be concerned with the following problems in the order named:

1. Heat calculations.
2. Chemical problems.
3. Mathematical matters.

As regards the first item we can scarcely conceive, even in the most elementary cases, of an appliance that will not require some thermal computations in analyzing and recording its performance. Naturally, such computations will become more difficult and involved in the case of larger and more diversified gas-consuming devices, so that the laboratory man should have a working knowledge of the most complicated heat problem that he is liable to encounter. As a more or less outrageous limit, we might mention the heat balance sheet on a water gas set as being the high spot of heat calculation complexity.

The gas industry will increasingly meet with chemical problems in its everyday industrial work, and more and more appliances will be installed, whose operation will be largely of a thermo-chemical nature. This obviously means that the laboratory must be prepared with sufficient brain ability to reproduce and figure out the problem on a smaller scale in the laboratory. Needless to say, computations involving heats of decomposition and formation are the ones to be expected along this line.

An Ingenious Imagination Needed

The mechanical aspect of the laboratory work will call for an ingenious imagination what with the complicated thermostats and other involved contraptions to be studied and tested. The laboratory man must needs be adept at quickly and thoroughly comprehending a piece of mechanism and at the same time noting any weak or faulty feature of the same.

It is felt that the chemical engineer eminently qualifies to ably and efficaciously encompass the problems briefly described above.

In addition, it is highly desirable that the man in question shall have had some actual first-hand experience in gas operating matters. We can well appreciate the value of such a man who has analyzed gas, tested boilers, etc., at the plant, served in the drafting room, studied pipe laying and meter shop operations, investigated complaints on the customers' premises, etc. Thereby, he will take to the laboratory mental assets of incalculable value. By all means the head of the laboratory should have had some previous experience with at least a fair-sized gas company. Of course, some knowledge of merchandising, while of value, is not at all essential.

The man who is at the head of the laboratory should preferably have as his first assistant a technical graduate who has had a schooling quite similar to his own. In this way, in the case of any enforced absence of the head man, the work will proceed with its usual smoothness and facility. Also by this arrangement there is no wide gap in brain power between the head man and those further down the line who do most of the work of collecting data, etc. These latter men should most of them have had a high-school education, and should possess sufficient gumption to proceed intelligently with a test once they are instructed as to the proper routine to be followed. As in the case of most any other kind of laboratory, the usual quota of beaker boys and bull workers are necessary. It would be well to bear in mind before leaving this portion of the present article that a very high grade of brain ability is requisite for the successful operation of the laboratory and some additional expense should not be spared in order to procure the proper men. Half-way men will not do even as good as half-way work, for it is peculiar to laboratory work that it is done either right or wrong, there being on such thing as half right. Here it would seem is at last an opportunity for the gas industry as a whole to make the central testing laboratory's positions sufficiently attractive along the lucrative line to ensure first an able personnel and then a successful project with a "knockout punch" in either hand.

The size of the laboratory in so far as floor space is concerned is more or less problematical depending largely on local conditions; however, as a very crude estimate, it hardly seems that an area less than 25,000 sq. ft. would be adequate.

Those readers who have worked in or had experience with laboratories well know that it is rather disconcerting to, figuratively speaking, "bark their shins" on tables or push a thermometer or what not in their co-worker's eye. In this regard, it is vastly better to have the laboratory 50 per cent too large than 10 per cent too small.

After picking out the proper location, we are next concerned with the installation of the more or less permanent equipment, which will include:

Air lines.
Gas lines.
Water lines.
Flues.
Lighting.
Boosters and other machinery.
Governors.
Gas analysis and calorimeter room.
Balance room.
Meters.
Water drains and sinks.
Electrical equipment.
Miscellaneous.

(*Continued on page* 401.)

Oil Gas a Possible "Way Out" Even With Eastern Gas Companies

W. S. Yard Describes Working of Latest Developments in Process

A brief description of the oil-gas generators and auxiliary equipment will make the following subject matter more easily understood. The oil-gas generators at the Potrero plant of the Pacific Gas & Electric Company consist of eight machines of the two-shell type, four of which are 16 ft. in diameter and known as Jones sets, old style, built ten or twelve years ago, held as standby equipment in case of emergency, and can produce about 3,000,000 cu. ft. of 550 B.t.u. gas each in twenty-four hours, requiring an average of about 9 gal. of oil per thousand feet of gas; they produce large quantities of tar and lampblack, declared W. S. Yard in a paper read before the twenty-seventh annual convention of the Pacific Coast Gas Association at Portland, Ore. The other four sets are what are known as Jones improved sets, 5,000,000 cu. ft. daily capacity of 550 B.t.u. gas operating twenty-four hours. Two of these sets, Nos. 5 and 6, were completed in May, 1915, and the other two sets, Nos. 7 and 8, started operating December, 1918. These four sets are equipped with everything possible to give perfect control and ease of operation, and represent the last word in oil-gas manufacture at the present day.

Size of Generators Involved

These sets consist essentially of two steel shells, brick-lined, 18 ft. 9 in. outside diameter and 14 ft. 3 in. inside diameter, connected at the bottom by a throat section 10 ft. high and 17 ft. wide. The primary shell is 49 ft. high, the secondary shell 63 ft. high, 13 ft. from the bottom of which is located the gas offtake, 6 x 6 ft., brick-lined, connected with a steel wash box 16 x 20 x 5 ft. At the top of the primary shell is located the blast tee and blast valve, operated by a hydraulic cylinder. The stack valve, also hydraulically operated, is located on top of the secondary shell. Two additional 12-in. valves, called secondary blasts, are situated at the bottom of the secondary shell. The primary shell is divided by a firebrick arch into two chambers, the upper of which, containing 4,000 checkerbrick with 3-in. space, is called the heating chamber or primary superheater. Into this is introduced the oil for heating the machine, and during the gas-making period steam is admitted to be superheated before reaching the making chamber below, in which are placed 17,000 checkerbrick with 3-in. space, supported on tiles laid on brick piers in the bottom of the generator. This chamber is known as the primary making chamber, and receives two-thirds of the total oil used during the gas-making period. The secondary shell is divided into three chambers by arches. One near the top supports 4,000 checkerbrick and forms the secondary superheater, where steam is admitted for superheating during gas-making period. The offtake arch is just above the gas outlet, and supports 17,000 checkerbrick forming the secondary make chamber. Below the offtake is located 12,000 checkerbrick supported by tiles and brick piers, the purpose of which is the fixing of the gas passing from the primary chamber. Steam and oil coils and burner connections are supported from shells. The heating burners consist of eight ¾-in. flattened pipe burners; the primary and secondary make sprays consist, each, of sixteen 1-in. flattened pipe sprays with proper steam and oil connections for atomizing the oil. Steam for water-gas production is introduced through four 1½-in. connections in top of primary superheater chambers, and also in secondary chamber. There is a 2-in. steam connection near bottom of primary shell where a large amount of steam is used during making period.

The gas offtake is connected to the wash box by a flanged cast section which has a 4½-in. water seal. Approximately 1,000 gal. of sea water per minute are supplied to the wash box for washing out lampblack and cooling the gas. The primary scrubber, which is a steel shell 14 ft. in diameter and 60 ft. high, is connected with the wash box by two 48-in. elbows in the form of an inverted "U." The scrubber is filled with wooden trays which are made of 1 x 4 boards laid on edge, with 1-in. space between, and water is sprayed over them from the top. The gas inlet is at the bottom, and the outlet near the top through a 30-in. standpipe, at the bottom of which is located the scrubber valve, hydraulically operated. A seal and overflow is provided for run-off of tar and water from the bottom of the primary scrubber. Near the primary scrubber is located a large G. E. centrifugal exhauster, turbine-driven, capacity 16,600 cu. ft. per minute. There are two of these machines, one for each two sets, and their purpose is twofold: first, to maintain a constant pressure of about 12 in. of water column on the generator while producing, and also to act as a tar separator. From this point on the equipment is very little different from that required in other gas plants, with the exception of the oil scrubbers, which will be taken up later.

Valve Controls Thirty Feet from Ground

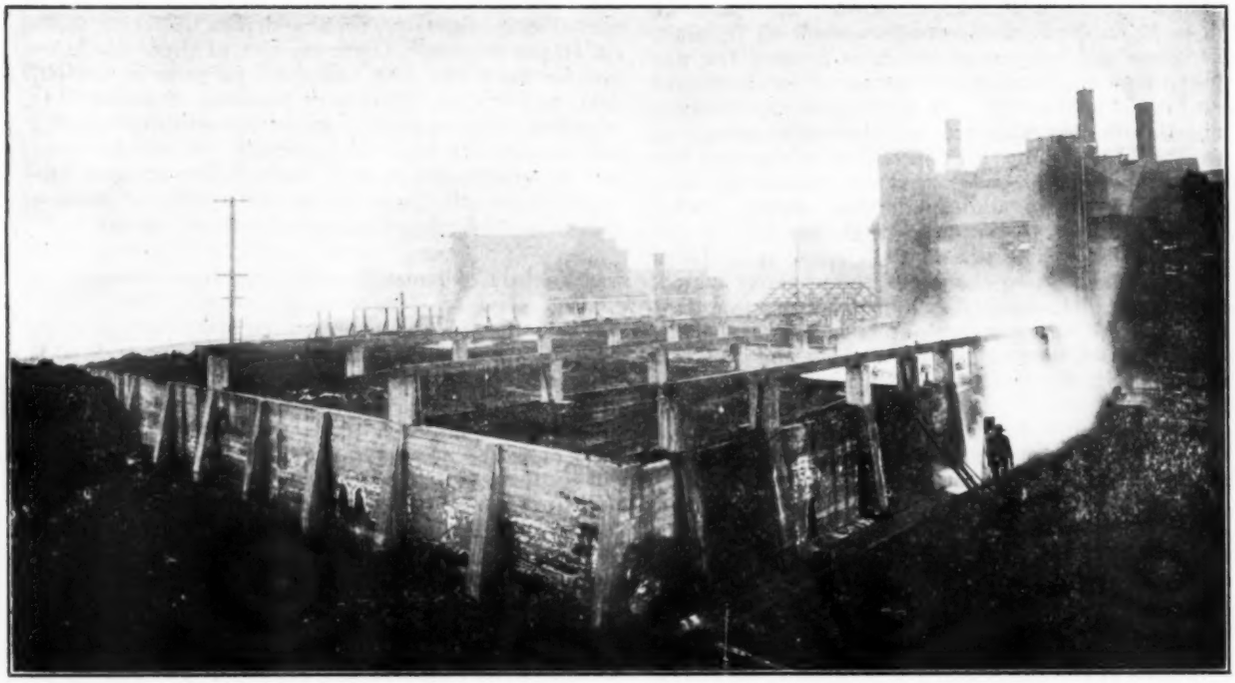
To return to generator equipment, the operating floor, on which are located the valve controls, is 30 ft. from the ground; 8 ft. below this is a mezzanine floor, on which are located all steam and oil headers, valves and meters, controls and recording mechanisms of which are extended to the main floor above. All controls and gauges are so arranged that operator can sit in an ordinary swing office-chair and run the machine with very little muscular effort. The oil-gas operator requires brains rather than brawn. Rate meters are provided for steam, oil and air, as well as registering meter for oil used. Pyrometers with connections in all the different chambers for temperature control, various pressure gauges and all equipment necessary to facilitate the operation and aid in the most efficient production have been provided. All generators are painted with aluminum paint to cut

down radiation losses and provide cooler working conditions. Generators are 25 ft. apart and the controls for two sets located between, so that the operator faces the machine. He has five operating levers, controlling stack, primary blast, two secondary blasts and scrubber valve at his right, arranged for safety so that in either the heating or making period the valve levers should all point in the same direction. If any lever is forgotten the operator will be reminded of the fact by its striking the next lever, which must be moved to proper position before he can proceed with operations. Directly before him are located five main valve stands containing the main oil and steam valves, back of which are located the pressure gauges and meter dials.

Storage Capacities

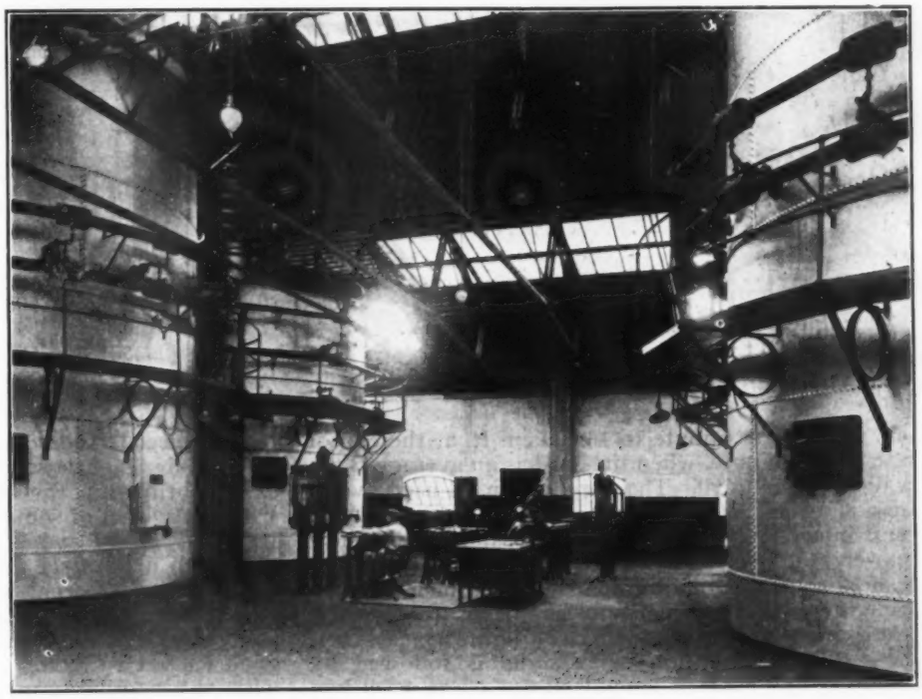
Oil is brought by barge from the refineries in 10,000-barrel lots. Two storage tanks are used, with a combined capacity of 37,000 barrels. Oil is supplied to generators at a pressure of 80 lb. and at an average temperature of 200 deg. Fahr. The oil is heated by means of steam in a heater of the ammonia-coil type. The temperature varies according to the quality of oil being used, the object being to maintain a viscosity of 75 Sayboldt at the generator, which seems to give best results for the type of spray used. A large amount of work has been done in the laboratory trying to determine some method by which the operator will be able to make the proper changes in the operating of the machine when the oil quality varies. We have found in using residuums that the key to the situation is the viscosity of the oil; the gravity and fractional distillations mean very little. The oils used at this plant, ranging in gravity from 14.5 to 21 deg. Be., have practically the same viscosity when heated to 250 deg. Fahr. To insure proper operating the viscosity of each cargo of oil is taken and operator told proper temperature to which this oil must be heated to obtain the required viscosity of 75 Sayboldt. In this manner, a uniform spray condition being produced, the necessary changes in blast or amounts of heating oil required for different oils can easily be found.

Now as to method of operation: The cycle consists of a ten-minute heating period and a ten-minute making period. Assuming that the generator has been brought up to proper temperature (1,600 to 1,800 deg. Fahr.), the heating period of ten minutes is divided as follows: Primary blast at the rate of 21,000 cu. ft. of air per minute at 21 in. of water-column pressure for three minutes, the idea being to burn some of the carbon deposited from the previous making period and to help heat the generator for the next run. The primary blast is now reduced to about 10,000 cu. ft., and 11,000 cu. ft. of air is added at the bottom of the secondary shell through two 12-in. blast valves for two minutes, this in order to burn carbon deposited in secondary shell. Then, at the end of the fifth minute secondary blasts are closed and primary blast set to 17,400 cu. ft. per minute and heating oil started at rate of 10 gal. per minute for five minutes, an average of 50 gal. being used for heating when carrying a make of 400 gal., which is light generating capacity. Sixty gallons at 12 gal. per minute is required when carrying 500 gal. of make oil. The generator now will be up to proper temperature if 17 deg. Be. residuum of about 18,600 B.t.u. per pound is used. Primary superheater temperature of 1,900 to 2,000 deg. Fahr.; primary make chamber, 1,600 to 1,700 deg. Fahr.; bottom of secondary, 1,600 to 1,650 deg. Fahr.; secondary make chamber, 1,500 to 1,600 deg. Fahr. There are normal operating temperatures as recorded by pyrometers when producing gas of 550 B.t.u. from residuum of 17 to 18 deg. Be. Heavier oil requires higher temperatures, and lighter oil correspondingly lower temperatures. At the end



CONCRETE LAMP BLACK SEPARATORS

of the heating period the blast valve is closed and steam turned on at the rate of 3,500 lb. per hour in the top of the primary superheater to help purge machine of products of combustion before the stack valve is closed. Heat oil is then shut off and scrubber valve opened and stack closed, entire operation taking about twenty seconds. Steam is next turned on at the bottom of primary shell in the throat section at the rate of 3,500 lb. per hour. Secondary superheater steam turned on at the rate of 2,500 lb. per hour. Steam should continue a full minute for production of water gas from carbon in machine before oil is admitted. Steam is allowed to flow at these rates for full ten minutes of run, and is not shut off until stack is opened and scrubber valve closed. One minute from time steam is turned on oil is started in primary make chamber at the rate of 40 gal. per minute and secondary make chamber at 25 gal. per minute for about seven minutes, at which time the oil is shut off and steam continued for two minutes to purge machine before stack is opened. During make period steam is used in atomizing oil as follows: Primary sprays, 2,000 lb. per hour; secondary sprays, 2,000 lb. per hour, and 500 lb. per hour on heat sprays to prevent burning. About 60-lb. gauge pressure at the operating table gives the proper spray conditions at generator. From numerous test runs made it has been found that 3.7 lb. of steam is required for each gallon of oil used in making gas at temperatures of 1,600 to 1,800 deg. Fahr.



OIL GAS GENERATOR SHOWING CONTROL VALVES AND GAUGES

Eliminating Carbon Stoppages

Advantage is taken of the fact that in running three or four generators continuously for seven to fourteen days the danger of carbon stoppages in machine can be eliminated by running each machine in turn for several hours at a higher temperature, using a large amount of steam and producing a gas of 520 to 525 B.t.u. This when mixed with gas from the other machines will increase the volume per gallon of oil, and by making a richer gas in other generators will give 550 B.t.u. This is one reason why it is possible to operate these generators over long periods of time without shutdown. Wash boxes are cleaned according to quality of oil used and gas produced; 17 to 18 deg. Be. oil requires cleaning about once in six weeks, 14 to 16 deg. Be residuum will run from one to two weeks. The general practice at the present time is to shut down each machine from two to three hours once a week, clean offtake and inspect sprays.

Checkerbrick has been in service over three years without shutdown; would say that the average life of checkerbrick in continuous operation will be not less than two years in machines of this type.

From different oils used, the most consistent results and best operating conditions have been obtained from refinery residuums between 17 and 18 deg. Be. of the following analysis:

Gravity at 60° F., 17.5° Be	Distillation
Viscosity at 130° F., 320 Sayboldt	0°-150° C.— 0.0%
Viscosity at 200° F., 75 Sayboldt.	150°-200° C.— 0.8%
H_2O trace	200°-250° C.— 5.8%
Flash 174° F.	250°-300° C.—11.6%
Fire 250° F.	300°-350° C.—20.5%
Sulphur 0.877 per cent.	350°-385° C.—52.6%
B.t.u. per pound, 18,634.	Coke 8.7%

To show what can actually be done when operating under favorable conditions and with oil of good quality, the following figures are taken from the monthly reports of the Potrero Gas Works—gas measured by station meters, corrected for temperature and pressure, and oil measured by calibrated tanks. At least three gas analyses and six calorimeter tests are taken during each twenty-four hours from the trunk line supplying the city. Monthly analyses shown are the average of these daily analyses; averaged observed B.t.u. the results of at least 180 calorimeter tests each month. Oil shown is the total gallons used per thousand cubic feet of gas manufactured. No oil is used for fuel in this plant, as the tar and lampblack produced are just sufficient for fuel requirements.

An inspection of the above analysis will show the uniformity of quality of gas so much desired and so hard to attain where the quality of gas during the first minute of making period is less than 200 B.t.u. and near the end of the run over 650 B.t.u. The amount of gas made during the run varies from 1,000

	1920						
	Jan.	Feb.	March	April	May	June	July
Gallons per thousand	7.02	6.93	6.87	7.01	6.89	6.89	6.89
CO_2	6.7	6.8	7.0	6.5	7.1	7.0	7.4
C_6H_6	1.2	1.4	1.3	1.3	1.4	1.3	1.3
CnH_2n	2.8	3.1	3.1	3.3	3.1	3.0	3.1
O_2	0.4	0.4	0.4	0.4	0.5	0.4	0.4
CO	12.9	12.9	12.7	12.4	12.6	12.5	12.6
H_2	45.3	45.0	45.1	45.5	44.9	45.1	44.9
CH_4	27.2	26.8	26.9	26.8	26.2	26.8	26.6
N_2	3.5	3.6	3.5	3.8	4.2	3.9	3.7
Specific gravity	0.508	0.511	0.515	0.508	0.521	0.514	0.519
Calculated B.t.u.	554	561	558	561	554	555	554
Observed B.t.u.	555	557	556	561	552	553	553
Thousand cubic feet manufactured	457,890	410,414	439,079	382,030	396,783	378,028	390,917

cu. ft. the first minute to 16,000 cu. ft. at the end of the fourth minute, when the gas has an average B.t.u. value of about 590. The variation in oil used over a period of six months from 7.02 gal. per thousand maximum to 6.87 gal. per thousand shows how closely the generators are watched and how they can be controlled with properly trained men and sufficient apparatus. Quality of gas being produced by the generators is observed by test lights at machines, and general condition of machine is followed by quantity and color of lampblack run off at wash box and tar overflow at primary scrubber. Temperatures are taken by base metal pyrometers and by means of sight-cocks in the various chambers.

Cleaning with Sea Water

The gas leaves the generator offtake at about 1,600 deg. Fahr., where it comes in contact with sea water at 68 deg. in the wash box, where the free carbon or lampblack is washed out and carried to settling pits to be drained and used for fuel. The gas enters the primary scrubber at a temperature of about 180 deg. Fahr., which is lowered to 130 to 140 deg. Fahr. on leaving the scrubber. This temperature is very carefully watched, as it has been found when it is maintained very little tar is found beyond the centrifugal exhauster. After leaving this exhauster the gas passes through twelve secondary scrubbers—eight water and four oil. These scrubbers are steel shells 12 ft. 7 in. in diameter and 39 ft. high, filled with wooden trays; gas inlet at bottom and outlet at top; water or oil, as the case may be, sprayed from the top for the purpose of further cooling and removal of naphthalene. The scrubbers are arranged six in a row—three water scrubbers, two oil scrubbers and a water scrubber last to remove all traces of oil vapor and prevent damage to purifying material. The flow of gas is divided so an equal amount passes through each set of scrubbers. The oil used in scrubbers is pumped directly to generators so that all oil used in producing gas has first passed through the oil scrubbers and has taken up a certain amount of naphthalene. Considerable difficulty has been experienced recently owing to the large increase of naphthalene complaints. This is due to two causes: the oil received, being 15.3 deg. Be. residuum of very poor quality, requires higher temperatures for gas production and undoubtedly results in a larger amount of naphthalene being formed; also, the oil, being stripped of all the lighter fractions, will not absorb the naphthalene with the result that at the present time a special crude oil of 18 deg. Be. is being tried for scrubbing purposes.

This brings up the question of scrubbing all gas with a wash oil of some sort, removing the naphthalene and benzol and developing the by-products of oil gas to help offset the increasing costs of oil and manufacture. Recent tests show large amounts of naphthalene and anthracene present in the lampblack and tar produced, both of which will have a very good market value for several years to come. This, with the possibility of benzol recovery for motor fuel, may be a source of income of no small consequence.

The lampblack produced from this plant averages approximately 12 lb., on dry basis, from each 1,000 cu. ft. of gas produced. One-half gallon of tar is produced per thousand, showing the following analysis: Water, 3 per cent; naphthalene, 13.5 per cent; heavy oils, 22 per cent, and carbon, 61.5 per cent. The tar, and also the naphthalene, produced from the secondary scrubbers is mixed with the lampblack and burned for fuel. This is sufficient for steam requirements of this plant, operating 3,000 to 5,500 boiler horse-power. The fuel value of this mixture has been found to be as follows: Containing 28.8 per cent H_2O—13,014 B.t.u.—dry 14,877 B.t.u.; material as fired containing 50 per cent moisture shows 12,000 B.t.u. per pound.

The flume carrying water and lampblack from the wash boxes discharges into the back of six concrete boxes 25 ft. by 75 ft. by 8 in. set above the ground level. Tracks are laid full length for loading cars, and plank gates are provided at front ends. Three sets of baffles are arranged in each box to collect the lampblack; overflow is full width of box and located at opposite end from inlet. Water overflowing from boxes is almost free from lampblack, but to insure complete separation this overflow water is run into further settling pits arranged with baffle boards so that clear water is finally discharged to the bay. Two large open-runner pumps are provided with suctions extending into each of the concrete boxes, as well as into the final settling pits. Method of operation is as follows: Wash-box water mixed with some tar from primary scrubber is discharged into back of concrete box and allowed to run until overflow at front shows lampblack passing over. This time varies from eight to twelve hours, when flow is changed to the next box. Pumps are now started, small amount of tar introduced near suction in box, and a large amount of lampblack containing tar thor-

(*Continued on page* 409.)

Labor Must Return to a Pre-War Basis of Production Even Though Wages Will Never Again Strike Level Hitherto Deemed Normal

Public Will Not Support Further Bowing Down to the Dictates of the Manual Toiler—Was With Him Up to the Point Where He Got What It Deemed Justice—Against Him When He Set Out for the Unreasonable

By WALTER A. FAIRSERVIS

Labor must return to a pre-war basis of production, even though wages never again will strike the level of the days before 1914. When this step has been accomplished then the gas industry will once again take up its interrupted progress and will move steadily forward. This was the consensus of opinion of four out of five men in our field with whom the writer discussed the labor problems of to-day during the past ten days. As is usual none of them was willing to be quoted, but in practically every case they insisted that their views and thoughts on the subject would carry as much weight without the use of their names as they would if spread on the printed page. Said one:

Last Few Weeks Have Shown a Change

"This labor question is loaded with dynamite and is likely to explode any minute. Now I don't want to be the cause of setting off the charge, particularly when I seem to have my workingmen pretty well satisfied."

Despite the timidity displayed by these gas-company officials and their hesitation to talk, there has been a radical change in the attitude of labor during the past two weeks. This change is well sized up in the remark made to me by a foreman in one of the large gas plants of the country, when he said:

"I just can't get over it. It was only a few weeks ago that the men almost refused to take orders from me. They were willing to let me direct them in their work up to a certain point, but when it came to observing the ordinary rules of the company they simply ignored any orders that I gave. But here within the past ten days they have changed, and now when a man doesn't do as I tell him I give him a real old-fashioned bawling out and, by George! he takes it. I even fired one of the men for breaking one of the rules of the company and there wasn't a peep from the rest."

"There must be some cause for this reversal. What is it? Are you responsible for it, yourself?"

"Maybe I am," came back the slow response. "I got talking to some of the fellows a little while back and one of them asked me during lunch hour if I could give a couple of friends of his jobs. He said that they had lost their old jobs where they had been getting big wages and now they wanted to keep on working. Well, that set me to thinking and I began inquiring around a little. I found out that there is a bunch of men idle, and it seems that most of the fellows who are out of jobs were the ones that were getting the big pay during the war. I don't want those fellows working for me because they are going to jump away just as soon as they can get a dollar or two a week more and, anyway, they have been used to giving as little for their money as they can, and the first thing you know they would have my entire bunch following suit."

"Yes, but that doesn't altogether explain the change in the attitude of your men. Didn't you do something or say something?"

"To be sure, I did. I called all the fellows together when they were going off shift one night and I told them that they had good jobs which they could keep if they wanted to, but that every man had to turn in and give the best he had or I'd have to begin looking some place else for men. Then I read off a list of names of men who had applied for jobs and usually I pointed out that one of the fellows then working for me had asked me to take on these men Well, sir, they knew I wasn't lying, and right away they began to do things a lot differently. And they began to pay a little more attention to their work. It was funny the way the thing happened."

Armed with this information, the writer visited the executives mentioned at the beginning of these articles. But while most of them smiled complacently, they refused to talk.

"You see how it is," remarked the first man (incidentally, the executive head of the company which employs the foremen just quoted). "We have got these men satisfied and they are improving in their work, so I am perfectly satisfied. Now I am not going to spill the beans by shouting about it from the housetops. Maybe this change is only temporary and the men may be planning to speed up a little preparatory to asking for more money or shorter hours or something. If this is the case, then I am not going to take any chances on saying that I have beat them."

"Supposing they do come for more money or shorter hours, what are you going to do about it?"

The Public Obtrudes

"I don't think that I am going to give it to them," was the reply, after a pause. "In the first place, I can't afford to, and in the second place, I wouldn't have public opinion in back of me if I did. And I can't afford to ignore what my consumers have to say on this subject, for I have been appealing to them to support me in my fight for a higher rate and they are not going to have labor or anybody else get my company back in the condition it was in six or eight months ago. I don't believe the men will want anything more, and even if they do I don't believe that I'll give it to them."

"What was the biggest reason given by the men in their previous demands?"

"The cost of living," he declared emphatically. "Every time they wanted more in their pay envelopes they always said it was because they needed it for bare living expenses. But that's just the point. I know that it isn't costing them as much to live to-day as it did a year ago right from my own experience and I know that my consumers are not going to let me add to my payroll and then have to pass it on to them through increased rates and so add to the cost of living. No, these men are getting enough money to allow them to live well even if not extravagantly, and the next time they start anything I'm going to put it up to my people and let them decide. But until that time comes I don't want to discuss it for publication."

Next we visited the executive operating head of a smaller company, but a man who supplies a very important district because of the variety of consumers both domestic and commercial that depend on him.

"What is the attitude of labor in your plant?" we asked.

"I can't rightly say offhand," was the reply. "In the first place I am up against a funny proposition. Just a short time ago I got a slight increase in rates. It wasn't much; in fact, it meant that we just about broke even on our present operating costs without taking into consideration the losses that we have had for the past few years. Just as soon as this raise was announced I was waited upon by a delegation of my men. They wanted to know what was going to be their share of the additional revenue. I was swept off my feet. I hadn't figured that they would be around as soon as this, and so I asked what caused them to believe that they were entitled to any more money.

"The spokesman said that the men had been through the period of adversity with the company and they felt that if there was going to be any reward coming now they wanted their share. They seemed to forget that their wages had been advanced an average of 150 per cent during the past three years. I was hot under the collar for a few minutes, I can tell you, but I dug out the cost sheets and showed them a few figures that set them thinking. Then I told them that if they wanted to strike, they could go ahead and do it and if they did I wouldn't make any effort to break it, but would close up shop and let the public decide who was to blame. Here is the amazing part of it:

"The spokesman conferred with his fellows for a few minutes and then he turned to me and said, 'We don't want to strike We don't believe in striking any more, but what we wanted to know was just how much money the company was going to make under this new rate. If it was going to get a lot we wanted our share. That was all.' Then they bowed themselves out of my office and I haven't heard a thing from them since. That was over a month ago.

"But the odd feature of the whole thing was the change that had come over the men. The last time they came to my office this same fellow was the leader and spokesman. When I tried to parley with them on the increase they demanded, they flatly declared that either I would come across with more money or they would strike. And they gave me two hours to make up my mind."

The third company visited was a strange one to the writer. In fact we knew practically nothing of its history or operating experiences. We had only one question to ask: "Will wages in your estimation ever get back to pre-war levels?"

"Absolutely not," answered the general manager. "In the first place, the old level for the price of gas will never return any more than other commodities will be reduced in price. Now I don't mean to say that gas is going to remain at an extremely high figure, for I don't believe it. But there will come a period of readjustment in prices and after it has been finished we will find that a new standard has been fixed for us at which to sell gas and this price will be made upon a basis of higher wages to labor. Not higher than they are now, for I believe that these labor costs will drop proportionately with the reduction in the cost of living but never will the old days of eight hours work for $1.75 and even less, return. Maybe this will take years, but I doubt it. I think that it is going to come within a mighty short time, for every indication points that way right now.

Unions Stifle Ambition

"Of course, there will always be an increase ahead for the fellow who works hard, is bright, and is willing to learn the business thoroughly, but that is going to be the exception instead of the rule.

"And that brings me to a point that I have long believed. Unions stifle ambition, and it is a peculiar way in which they do in my estimation. Take the ordinary members of a union and trace just how they got their cards. They started off by being apprentices. Maybe they worked for a period of two or three years after leaving school for half or three-quarters of the wages of the full-fledged union men. Then suddenly, overnight, they are declared capable workmen and we are notified that they are entitled to full pay. I understand that they must pass certain tests before being admitted to full union privileges, but most of these tests are based on the new scale of work, which is a reduced scale as every one will admit. From the time that they have become full union members they draw the same wages that we pay to men who have spent their lives in the business.

"Take these tests that they must undergo. The employer is not called in. He is not asked whether the would-be union man is capable and whether he is thoroughly satisfactory. He is simply made a union member and we must pay the freight.

"Take the ordinary commercial employee. He passes through various stages, and as his worth increases he is paid more. If he is bright and energetic he is passed ahead rapidly, given greater responsibilities and paid accordingly. He is neither held down to nor boosted up to the level of his fellow employee. He has the chance of earning double the money that the men at the next desk is making if he is worth it. And the increases he gets are based on the question of worth, not on the question of the passage of time.

"With union labor I find it entirely different. The passage of time seems to be the greatest element. Here is a body of men who have been doing the same class of worth year in and year out. They do just so much because the union provides that that amount constitutes a day's work. But when each six months rolls around they come to me and ask for more money and the plea is based on the question of the fact that so much time has elapsed and they feel that they are entitled to more money. No idea enters their demand as to the worth of the job in the scheme of the service rendered to the pub-

lic. Simply that they want more and if they don't get it—well, then, I will have to take the consequences."

The fifth and last company was headed by the exception to the series of short interviews quoted above. Summed up this is what was said:

"The demands of labor to-day are ridiculous. They want automobiles, silk shirts, servants and every luxury that modern civilization has devised. Why I have gone out on a week end with my family and found that the same resorts that we frequent are the gathering places of my laborers. They lounge in with their silk shirts and socks and expensive clothes and act the man about town to perfection, while their wives wear diamonds that are too expensive for me to afford and then they drive away in high-priced new-model automobiles while I still drive the old 1917 and find it all I can pay for. But this isn't all Monday mornings, when they show up for work, they are still wearing the silk shirts and they continue to keep them on, no matter what kind of work they are doing. If they ruin those expensive articles of wearing apparel they laugh, pass it off as a joke, and presently they come around to me to foot the bill in the way of increased wages."

Wasteful Attitude

"But," we pointed out, "it is no crime to wear silk shirts and to want the good things of life. It is a sign of advancement in our method of living and education if the workingman wants the same ease and comfort that you are getting."

"I'm not disputing that in any way," he replied. "The thing that I am disputing is the fact that they are not willing to put in as hard work to get these things as they should. In other words that they want to increase their wages but decrease their efforts to earn them and also have more time in which to enjoy these increases. I don't think that is fair. And I certainly don't agree to any proposition that involves the waste that is shown every day by some of my men.

"As to these wages remaining where they are to-day, I don't believe that they will in a thousand years. I thoroughly believe that costs will go back to the days before the war, and the sooner this happens the better it will be for the United States. If anybody attempts to keep prices up to their present level, and by prices I mean the cost of buying labor as much as I do every other price that enters into my manufacturing cost, there will be a period of hard times in this country such as never have been witnessed. The public has been footing the bill, but I believe that it is getting darned sick of it.

"I don't want to be a calamity howler, but I am firmly convinced that every price, including the price of gas, will get back to a pre-war level and then the country will start ahead again in its old-time way."

When these articles were first undertaken the writer approached one of the big figures of the United States with a request for an interview. The first talk lasted two hours. This was followed by a second conversation that took equally as long and from this an article was prepared It was planned to publish it among the first two or three and because of the very nature of the matter contained in it, it was firmly believed that it would create a sensation in the gas field.

It told of the way the minds of the big men of the country, the men in supreme authority, were working and it declared for a clean-cut line of action. It was not the view of the writer; it was instead the opinion of this man. The article was prepared and submitted for approval before publication. Three times have there been conferences since the submission of the article, and each time there has been a swaying from the main point until the heart of the interview had been cut out and there remained only an empty shell. But now we have the definite promise of being able to furnish it to the editor of the American Gas Engineering Journal for his approval or disapproval. The article as written probably will never see the light of day on the printed page, but there was so much meat in it that no matter how it finally reaches the gas industry it undoubtedly will be well worth the space it consumes.

In this connection we also have approached numerous members of regulatory bodies, asking for their views on the labor question. But it was too ticklish for them to tackle. "After election is over, we will be willing to talk," each one of them declared. It would seem that as soon as the national election has been held there will be a flood of words and opinions that will be overwhelming. But it may be that by the time they are ready to talk there will be no labor problem.

Seventy-five Per Cent of Galvanizing in Chicago Done by Gas

D. A. Flynn Emphasizes the Degree of Real Vision Needed to See Gas Instead of Coke for Kettles that Hold Forty Tons of Zinc

Galvanizing is the trade name for coating metal (usually iron or steel) with zinc, to prevent oxidation or rust.

The three most common methods for obtaining this results are known as electro or cold galvanizing, sherardizing or dry galvanizing, and the hot dip, or wet process. Although the last mentioned is the process that particularly interests us, a brief description of the other two is interesting, declares D. A. Flynn of the Peoples Gas Light Coke Company, Chicago, Ill., in an American Gas Association convention paper.

Electro or Cold Galvanizing

Is a zinc coating applied electrically. This process consists in setting up the articles to be coated as cathodes in an electrolytic bath of soluble zinc salts, the anode being metallic zinc. This method is used a great deal on small screws, nuts, light stamping, etc. Threads are not affected by the ordinary coating.

Sherardizing or Dry Galvanizing

Is comparatively new and can be used on many articles to advantage, principally on bolts and nuts (no recutting being necessary). To carry out the process, the articles are first cleaned by mechanical or chemical means, then placed in iron drums, cars, or boxes, with a quantity of ordinary commercial zinc dust. The work is then heated to a temperature at which zinc dust vaporizes, without melting, and the vapors pass directly into the article. The coating which results is not pure zinc, but an alloy of about 90 per cent zinc and 10 per

cent iron. Gas has been used as a fuel for this work very successfully.

Hot Dip or Wet Galvanizing

However, the gas industry is most interested in what is known as the hot dip or wet process. This is the oldest and most widely used, for the reason that it gives an excellent protection for a long period of time, and is very well adapted to small light work, such as stampings, and large bulk work, such as castings, tanks, etc.

Material to be galvanized by this process is first thoroughly cleaned with acids to remove all foreign matter. After being dried, it is dipped into a bath of molten zinc and kept immersed until it attains the same temperature as the zinc, which varies from 780 to 950 deg. Fahr. The material is then taken out, drained of surplus metal and cooled. It will be found that the entire surface of the article is covered with a continuous coating of metallic zinc.

The zinc is melted and maintained at temperature in kettles usually made of wrought firebox steel from three-quarters of an inch to two inches in thickness.

For many years coke was considered the fuel best adapted to this class of work. Oil has also been used to some extent. However, within the last few years gas-burning equipment has been developed which has proved very successful and practical.

Because of the numerous vital points requiring careful attention in the process of hot galvanizing, such installations are usually given a wide berth by the ordinary gas engineer, particularly when he is called upon for rigid guarantees as to fuel requirements and successful operation.

Galvanizing is one of those heating problems which lends itself to solution with little difficulty, when attention is given to detail by one who will take note of the technical and scientific facts involved, and apply them logically.

To make the use and application of gas heating for galvanizing and similar operations clear the following will give a few ideas of a typical installation in successful daily operation. The plant in question has two kettles, a large one, twenty-two and a half feet long by three feet wide by three feet deep, and a small one twelve feet long by thirty inches wide by forty inches deep. Gas in this case is raised from distribution pressure to about ten pounds per square inch. Two compressors are in use, one of which has a capacity for supplying enough gas during working hours, and a small one used at night, over Sunday, etc. The load is readily shifted from one to the other and the resultant economy is considerable. These compressors are directly connected to electric motors and require very little attention.

Gas in a single line is led from the compressors to the kettles.

Each side of the kettle is provided with several batteries of burners suitably manifolded and spaced. These batteries are under separate control and for individual rates of operation can be adjusted to suit the requirements, whether for working rapidly or slowly, or for merely holding the bath molten. Pressure gauges, however, enable the operator to duplicate any given rate of firing for each burner.

The high pressure gas is made to induce, through an automatic device, the proper amount of air for complete combustion. This mixture is directed through the burners into a bed of highly refractory material at the bottom of the heating chamber, the refractory material being separated from the steel kettle by a tile of suitable height and thickness.

The mixture penetrates the refractory bed for a certain distance in reaching a zone where the flow rate equals the combustion rate for the mixture employed.

Within this zone complete combustion takes place, generating an intense heat in these beds. The result is an incandescent bed running the entire length of the kettle on each side.

The radiant bed is a very valuable adjunct in the transmission of energy to the work. Because of its refractory nature its temperature can be made to exceed that of any flame the furnace walls or the kettles would tolerate without injury. The radiant energy issuing from the refractory is more readily absorbed by the steel than the heat of the gases within the furnace, and the absence of dull flame and soot cause full benefit to be realized.

The galvanizer whose plant has been roughly outlined, previously used coke, and was the first one in this city to use gas for galvanizing.

One of the salesmen in the Industrial Division of the Peoples Gas Light & Coke Company, in Chicago, recalls his experience in landing this first "galvanizing" prospect. At the very outset he found himself seriously handicapped. He could talk gas and heat units and temperature and burners and accessories, but was at a disadvantage in not being able to show a gas-fired zinc kettle in operation. However, with the characteristic self-confidence of a salesman who has faith in the goods he sells, as well as in himself, he approached the president of the galvanizing plant referred to above.

Fortunately, he encountered a broad-minded man, who made him feel at ease by stating concisely that he was of course interested in anything that pertained to the galvanizing business. "I don't think gas would be practical in our business," he said. "Do you realize that our large kettle holds about forty tons of zinc?" He wanted to see an installation in operation, but this of course was impossible. The salesman told him of a plant at Indianapolis, Ind., and suggested that he get in touch with this concern.

About two weeks later he sent for our salesman and told him he had become very much interested in gas as a substitute for coke. He had sent his superintendent to Indianapolis, and he had reported that the gas-fired plant in that city was a pronounced success. We submitted a proposal, and a few days later began the installation. To-day the president of that company, and the salesman, are good friends, and the former is glad at any time to point with pride to his gas-fired kettles. That was the beginning of a successful campaign for gas-fired kettles for galvanizing. The owner of this first installation is one of our best boosters, and his plant proved to be our best advertisement, for we could now show a successful installation and a well-satisfied customer.

Since that time practically 75 per cent of the galvanizing in the city of Chicago is being done by means of gas-fired kettles. The total monthly gas consumption resulting from this work amounts to approximately 15,000,000 cu. ft. The remainder of this work which is available will amount to about 5,000,000 cu. ft. per month, and we expect before long to have the galvanizers of this city 100 per cent gas consumers.

(*Concluded on page* 404.)

Use of Gas in Educational Institutions

W. L. Powers Would Have Present-Day Managers Seeking Industrial Business Profit Through Taking a Leaf Out of the Experience of Old-Time Superintendent Seeking Cooking Business

War, implying as it does, intense production of factory, foundry and shop, increased efficiency of transportation, utmost utilization of raw material, effective elimination of waste, maximum effective consumption of labor, time, and material, has wrought an evolution in industry that has relegated pre-war measures to the dump heap of the past. Under the stress of war the industrial world faced the problem of increased production with the means at hand. This demand acted as a spur to the efficiency and initiative and the thoroughness of the American business man. The inventive faculty of man found new processes to supplant the old; his mechanical skill and foresight ferreted out the flaws of existing methods. In this industrial revolution, gas came into its own and, on the strength of its own merits, won a commendable place in American industry. But this advancement is not merely transitory, something that has sprung up for the immediate alleviation of economic pressure. The crisis of reconstruction is as great as that of war, and the lessons of war-time production have come to stay. The part that gas must play in this new era is as vital and as necessary as that of any other field of industrial endeavor, declared W. L. Powers, in an American Gas Association convention paper. Shall industrial gas hold its place, or shall it be relegated to the scrap heap of war-time measures and experiments? The answer lies with the gas world. Industrial gas has won an enviable place in the world of production and it is the duty of the gas associations and the gas man to see that that position is maintained, and that advancement is secured. We shall take the liberty to suggest one very potent measure in this much-needed program of industrial gas development.

The program that we suggest in this paper is an effective propaganda in the schools, colleges, and universities of this country. As never before, modern industrial methods demand efficient mechanical and labor-saving devices, sound scientific processes, and thoroughly-trained and skilled working staffs, both in the executive and laboring departments. The result is that the highly-trained specialist, the engineer, the skilled mechanic, are in demand, and are the backbone of the industrial system of this country. The graduates of our engineering, technical, and mechanical arts schools and universities, are the rank of men from whom the managers, the superintendents, and other officers of the managerial staff are selected. These are the men whom the gas engineer must reach, for they are the men immediately concerned with the mechanical and engineering departments of industry. These are the men who are to be schooled in the application of gas to modern industrial methods. This man must be reached—but how? What would prove the most effective method of training? We answer, "The installation of gas in our schools."

The gas world must creat a demand for gas in industrial fields. The greater this demand, the greater shall be the need of supply. Hence, the demand on one hand will institute a greater demand on the other. But how create this demand? Again we answer: by the installation of gas in our schools. The solution we offer does not call for the institution of a new set program of study, for such a step is not needed in arriving at the desired end. It is well known that any engineering course in a school of recognized standing necessarily implies a maximum of time in laboratory and shop. A student registering for the engineering branches must spend a minimum of four years in the completion of his course. During this period the experimental and practical work of laboratory and shop must be proportionate to his theoretical training. If this man carries out his practical work in a shop or laboratory where gas is utilized, what is the natural outcome? That man leaves his school with the conviction that gas is the most efficient and desirable industrial agent, where there is a question of selection or preference between two or more processes, as steam, oil, gas, etc. That man is a live prospect. He is a potent factor in the creation of a demand. Multiply his case by the thousands and you will fully realize the benefits to be derived from such a program. It now devolves upon the gas association or the expert to approach his man or group of men. Demonstration is unnecessary, for the man has been effectively convinced of the utility of gas as a measure of efficiency in his line of endeavor. Three-quarters of the difficulty has been removed. The man is already trained and the gas man has now but to close the deal. This step necessitates convincing the man higher up. But in approaching him, the gas engineer is strengthened by the support of the active factory, foundry or shop force. Where formerly he had but the merits of his commodity to urge, he now has the support of a group of men vitally concerned in his installation. But we need not dwell longer on this phase. Its lasting results are obvious and should appeal to the progressive instincts of every gas man.

But we have considered the man higher up only. By that we mean the man with the superior technical training, who by virtue of his education may command a more responsible position in an industrial staff. But what of the foreman, the superintendent, the skilled mechanic—in a word, the types of men upon whom rests the ultimate productivity of industry? It may be urged, and wrongly so, that in the sale and installation of gas appliances, this group deserves but scant consideration. Those who urge this contention lay stress upon the conviction of the executive staff and the immediate sale of the commodity. But the future rests, not upon the immediate sale only, but, as we have stated before, upon the creation of demand or the extension and security of sales; and the consideration of this angle—the man of the shop, the factory, and the foundry—is a vital and important factor. Upon him rests the operation of the appliance, and it lies with him to condemn or commend. How reach him? This is a question easily disposed of. A man evinces the ambition to better himself in his line of work, who is actuated by the determination to render himself an indispensable factor in production, who casts about for means to realize this desire, will ultimately en-

ter the night school, the short and intensive course in mechanics, or the correspondence course. If he is trained in a technical school, be it night school or otherwise, where gas appliances are installed, he will enter his shop or factory with the thorough conviction that gas, where it is possible to substitute for other methods or processes, is the desirable thing. The gas man and the gas industry has earned another booster who may prove a deciding factor when the installation of gas appliances is in the balance.

This propaganda, if you will, in colleges, universities, and technical schools, cannot be too strongly urged. To bring out our point, let us indulge in a comparison. Industrial gas is an infant industry. Its full possibilities are far from realized, and its wonderful economic value but now unfolding. In the last three decades, the gas man has considered the gas industry but a local problem. The gas man's world was his plant, and the list of his town or city consumers. The domestic problem, to him, was the crux of gas prosperity, and to this end he bent all his efforts. The highest efficiency of his plant, the increase of his main-mileage, the growth of his list of consumers, the sale of stoves and other domestic installations—these were the problems that engrossed his attention. In the forefront of his progress stood the gas stove, the gas light, and the gas water heater. He bent every effort to the elimination of the gasolene system of lighting. After his conquest in this field, he set about to bolster his stove sales. Let us learn a lesson from this local manager or superintendent. He did not resort to the laborious and slow process of convincing each and every house in his locality of the superiority of the gas stove over the coal or oil stove. He resorted to good advertising; he bent every effort toward the creation of a demand. It was necessary to install a few stoves in the neighborhood and leave future sales to human nature and the good housewife. This was one and the least of his methods. He went to the school. The awakening interest in establishing domestic science courses in local high schools he used to his advantage. The gas man effected the installation of gas stoves in the schools where these courses were offered. Was the mere immediate sale of a few stoves the only object of his quest? Decidedly no. He was grasping the opportunity of creating a demand. But accustom these potential housewives to a gas kitchen, and future sales multiplied with the number of girls following the course, and the number of marriages following graduation. I feel that a better comparison could not be found. Gas has come into its own as a universal issue. It has ceased to be merely a problem of local supply and distribution. Is it less logical then to train the man in industry, as the girl in the home was trained to the domestic desirability of gas? Can we justly say that the men of the greatest industrial gas field of to-day are less farsighted than the superintendent of the local gas plant of a decade ago? Such a supposition is preposterous. We need but realize that now is the acceptable time, the time of opportunity.

It may be said that the measure advocated in this paper is not practicable, that the installation of gas appliances in the great laboratories and shops of our engineering and technical schools would count but little. It may be stated that a strictly gas engineering course only would effect the desired results. But this is not altogether true. It is not our intention to turn out gas engineers only, but men highly trained in other engineering fields who have been prejudiced, if you will, in favor of gas utilization and installation wherever possible. Men who for four years have come into intimate contact with industrial gas and are thoroughly imbued with the idea that gas is a most efficient and highly economical agency. Your engineer is merely a highly skilled mechanic with a vast sum of technical knowledge to assist him in the practical work of life. His training has fit him to develop his mechanical genius to the utmost; it has sharpened his inventive faculties and strengthened his initiative and foresight. He fully appreciates the high standards of efficiency that must characterize shop and factory installations and methods. He fully appreciates the fact that the more specialized and effective his means, the greater his production. He leaves his school and his university to take up his life work. If he be in the position to overhaul the equipment of his factory, of his shop, or of the industrial methods in operation, he will do so. If he has been trained in the uses of gas, gas will profit. Of the skilled mechanic, the man who does the immediate work, we need urge little argument, in favor of the benefit derived from his training. The man higher up has labored over a branch of shopwork in college; he appreciates what labor is employed by the man in overalls in the production of that bit of finished material; he has learned that gas is the most effective agent in that production. The outcome is that he will consult with his skilled mechanic, who has also learned of the desirability of gas in his night school or from his technical books, and the conviction of both can but result in the advancement of industrial gas in another instance.

But how approach the college or university? The average industrial gas engineer, who is fully conversant with his field, need fear nothing in this regard, nor cast about for means of overcoming this difficulty. Gas has and will continue to stand on its own merits, and need not plead experimented demonstration. In the industrial field, it has been severely tried and never found wanting. The gas man who has the enthusiasm, the confidence, and the conviction, may stand the test of any professor, whosoever he may be. With all deference and respect for college professors and college technical education, we may nevertheless truthfully say that most college men are woefully ignorant of gas and gas efficiency and possibilities. Gas is a field that is but now coming to the front as a field of engineering endeavor. The chemistry of gas and gas by-products bids fair to revolutionize certain fields of chemical engineering and experiment. But whilst gas is pushing onward in this and in other spheres, its progress in the industrial field is no less startling. The gas man of to-day is a pioneer. Let him seize the opportunity and blaze the trail in this field, for the day shall come when the technical men of the educational world will be compelled to recognize in gas a vast area of research and experimentation. But not in the school alone is this true; it is not the professor and the college graduate alone who must be convinced. Consider for a moment the great number of men who depend upon correspondence courses and the written word for advancement. These men are compelled to study in the home, and must find their laboratory in the shop. By whom are these trade journals, correspondence school textbooks, and other reference books written but by the men who have been trained in college and have spent years in practical work. If these men are confirmed in their opinions of the advisability of gas utilization, wherever possible, these convictions will creep into these textbooks, which will become but so many propagandists' mediums for industrial gas.

The possibilities of this field are so great that we find

it impossible to confine it to the limits of this reading. But consider the vast number of technical men who every year leave the colleges and universities of this country to take their places in the industrial world. One great school alone, the University of Illinois, has enrolled over four thousand technical students. Every year this great University gives to the industrial world hundreds of highly trained men. Suppose these men gas boosters. Multiply their numbers by the hundreds and grasp the meaning it bears to the gas world at large. Is not the accomplishment of this highly desirable fact something for which the brains of the gas industry should strive? Who can estimate the immense advantages that are bound to accrue? In the light of this fact lies the justification of an effort along these lines.

In conclusion, we urge the gas associations and the gas man to give this subject the serious consideration that it warrants. Gas has an important part to fill in the industrial life of his age, and the measure in which it plays that part will determine whether it shall maintain its place in importance. Gas is a vital factor in that much-needed increased production that has become the cry of the economic world. Such being the case, it is the duty of the gas man as a producer to see that gas becomes an efficient agency of production and shares in the progress of industry. If gas will increase the output of a factory, a foundry, or a shop, it is the duty of the gas man to see that it is installed. But we need not dwell long on this topic. This idea, though altruistic, is nevertheless true and partakes of the nature of duty. It is perfectly obvious to the gas world and to an ever-increasing number of industries, that gas is a desirable thing. As a result, present-day installation and utilization of gas and gas appliances stands unparalleled in gas and industrial history. The future promises a greater and more widespread usage of gas appliances. This being the case, a new duty falls upon the shoulders of the college or university faculty. In the next few years, the technical man who leaves his college or university, woefully ignorant of gas, will suffer in competition with the man who has learned of gas in his college. On whom is the blame to fall in the first instance but on the school which failed to give that man a thoroughly technical education and training.

In the light of this altruism it may seem far-fetched to mention duty in connection with this consideration, nevertheless the gas man owes this to his business and the industrial world at large, and the college professor owes it to his technical student. The duty of each to his particular field and to the industrial world at large will serve as an aid to each other. Both gas man and college professor must through necessity enter into this new field of endeavor. But the gas man must lead the way. Upon him devolves the obligation of grasping every opportunity of progress and advancement. And we are of the conviction that the move advocated in this paper is too far-reaching and important for the opportunist to cast aside.

Moisture in Coal

Experience with the usual type of heavily charged gas retort tends to show that moisture in reasonable proportions has no harmful effect on either gas or by-products and under certain conditions may even prove helpful for increasing the volume of gas yield per ton. The trend of opinion, however, so far as it affects the coke-oven industry is against the presence of moisture, the main drawback associated with wet coal being the reduction in oven capacity which it envolves.

Determining the Influence of Excess Gas on Fuel Consumption in Gas-Fired Oven Furnace

Otto Lellep Concludes More Gas Is Wasted by Excess Air than by Excess Gas

Under practical working conditions, furnaces are operated not only with excess air but often with excess gas as indicated by burning gas in the flue holes. The tests undertaken answer the question: How much gas can be saved by a properly designed proportional mixer? declares Otto Lellep, in a paper prepared for the 1920 Subcommittee on Proportional Mixing of the Industrial Fuel Sales Committee of the American Gas Association.

The furnace used for experimental purposes was the same as used by last years subcommittee, a standard A-25 oven furnace of the Surface Combustion Company. The outside dimensions of the furnace, with the hearth and refractory baffle taken out are: depth, sixteen inches; height from the bottom to the crown fourteen inches. The free working space of the hearth is twelve inches deep and ten inches wide. The furnace is lined with three-inch thick fire-clay brick and insulated with a one-and-a-quarter-inch Nonpareil cork brick between the outside cast-iron casing and fire-brick lining. The space between the fire-brick arch and top casing is filled with loose Sil-o-cel.

The furnace has four burners, two on each side. The burner nozzles shoot the air and gas mixture against the bottom of the furnace below the hearth. The refractory baffle is so arranged that it leaves free passage for the flame to be thrown below the hearth, where it rubs against the surface of the bottom and the hearth. The burning mixture from one burner enters at one side of the hearth and comes out on the other side of the furnace. The piers supporting the hearth and the burners are arranged in such a way that the opposite streams of gases below the hearth do not check each other. The size of the burners is chosen according to the temperature desired.

Furnace Had Been in Severe Use

For some time, this furnace has been in severe use at very high temperatures and the lining, therefore, was not in as good condition as when used last year for testing. As the tests were to be run with excess gas, *i. e.*, carbon monoxide in flue gases, the furnace was located in a well-ventilated place below an open shed. New York City gas was burned. Both gas and air were measured, the first by a 60 light gas meter, the second by a Venturi meter, as no gas meter of a suitable size was available. The Venturi meter was calibrated on air by the above gas meter and the values obtained were plotted on logarithmic paper, cubic feet per hour as ordinates and the pressure drop in the Venturi, as indicated by a water gauge, as abscissae. The points lay all strictly on one straight line. In this way a simple, small and at the same time accurate measuring device was made. Non-pulsating air was supplied by a Nash compressor.

Only the so-called "holding" gas consumption or consumption at heat equilibrium was determined. The

furnace was generally lighted at 8.30 in the morning, heated up and kept running as long as the gas consumption to maintain some definite temperature remained practically constant. With this furnace the desired condition was, for practical purposes, obtained after five or six hours' operation. The readings were taken generally after three o'clock P. M. At the beginning, the furnace was run with a correct mixture of gas and air, as supplied by the proportioning low-pressure inspirator of the Surface Combustion Company. The correctness of the mixture was checked by a metallic copper indicator.

Polished Metallic Copper a Carbon Monoxide Indicator

Previously, an Orsat gas analysis apparatus was used for the latter purpose. But, in connection with another research, the oxidation of copper and reduction of its oxide by flue gases of gas furnaces was studied. It was proven that a piece of polished metallic copper kept in hot flue gas is at least as sharp an oxygen or carbon monoxide indicator as an Orsat apparatus and to facilitate and simplify the experimental work, this copper indicator was used. Free oxygen causes a dull coating of copper oxide to form on metallic copper. Carbon monoxide if present, reduces this dull coating and makes the surface metallic and bright. The temperature of the copper for greatest sensitiveness should be not less than 1,200 deg. Fahr. and not much over 1,400 deg. Fahr. These two gases do not occur at the same time in this type of furnace at the temperatures used in the tests. With the proportioning device adjusted so that copper oxide was not reduced and metallic copper not oxidized within a reasonable time, say one minute, the proportioning of gas and air was considered correct or the mixture supplied, "theoretical."

When this condition was reached and the gas consumption for the temperature investigated remained steady, the gas and air meter readings were taken. The correct ratio of air to gas was found to be 5.4 to 1 during three days and 5.5 to 1 during one day. Then the mixture was made richer. To maintain the same temperature in the furnace, it was necessary to increase the burner pressure, or in other words, the amount of air and gas supplied.

It took around an hour to stabilize the previous temperature with a richer gas and air mixture. When that condition was obtained again, readings on the gas and air meters were taken and the amount of gas and air consumed by the furnace at this particular period thus determined. Then the mixture was made still richer, the temperature again stabilized and the former procedure repeated.

The numerical results of the tests made are shown in Table 1. Only the stabilized temperature and air and gas was figured as follows and is shown in the three last columns of the table. July 6, at 5 P. M., 1,430 deg. Fahr. was maintained with 77 cu. ft. of gas and 314 cu. ft. of air supplied to the furnace per hour. The correct ratio of air to gas was found at 4 P. M. to be 5.4 to 1. It is assumed that the composition of gas remained constant during one afternoon. Consequently, the correct amount of gas for the air supplied at 5.06 P. M. would be $\frac{314}{5.4} = 58$ cu. ft. per hour. The actual gas supplied was 77 cu. ft. Excess gas in the mixture supplied to the furnace $= 77\text{-}58 = 19$ cu. ft. or $\frac{19 \times 100}{58} = 33$ per cent. In the same way the percentage of excess gas can be figured for other observations.

The experimental data have been plotted. The curves for each temperature are almost straight lines. The slope of the curves increases with the temperature. The curve for 2,500 deg. Fahr. with excess gas over 50 per cent runs almost parallel to the vertical axis of the coordinates. That means that the theoretical flame temperature with over 50 per cent excess gas approaches the furnace temperature of 2,500 deg. Fahr. If we

(*Continued on page* 408.)

Table 1—Effect of Excess Gas on Holding Consumption

Date	Time Hrs.	Time Min.	Burner Pressure Inches Water Gauge	Furnace Temperature Deg. Fahr.	Actual Gas Cons. Cu. Ft. Per Hr.	Actual Air Supplied Cu. Ft. Per Hr.	Correct Ratio of Air to Gas by Volume	Correct Amount of Gas for Air Supplied Per Hr.	Excess Gas Supplied Cu. Ft. Per Hr.	Per Cent Excess Gas Over Correct Amount
July 6	4	00	0.6	1,430	48	259	5.4	48	...	...
July 6	5	06	0.8	1,430	77	314	...	58	19	33
July 6	6	00	1.0	1,430	140	360	...	66.6	73.4	108
July 6	7	20	1.5	1,430	190	385	...	71.5	108.5	152
July 8	2	25	1.8	1,830	89	480	5.4	89	...	...
July 8	3	00	2.3	1,830	124	540	...	100	24	24
July 8	4	00	3.8	1,827	225	680	...	126	99	78.5
July 8	4	45	7.4	1,830	379	870	...	161	218	135
July 9	4	47	3.9	2,155	133	720	5.4	133	...	...
July 9	5	15	4.7	2,150	160	760	...	141	19	13.5
July 9	5	55	5.6	2,165	184	840	...	156	28	18
July 9	6	44	8.9	2,150	282	1,025	...	190	92	48.5
July 9	7	10	13	2,160	397	1,170	...	216	181	84
July 12	1	35	5.2	2,500	209	1,150	5.5	209	...	...
July 12	2	20	7.2	2,500	300	1,350	...	246	54	22
July 12	3	00	9.8	2,500	379	1,550	...	282	97	34.4
July 12	4	00	14.4	2,500	516	1,900	...	346	170	49

American Gas Engineering Journal

SIXTY-FIRST YEAR

Published Weekly by AMERICAN GAS LIGHT JOURNAL, INC., 150 Nassau Street, New York, N. Y.

ELBERT P. CALLENDER, Pres. S. G. KRAKE, Vice-Pres.-Treas. A. M. GLEASON, Sec'y

EUGENE C. MILES, Editor

Subscription $3.00 per year, including postage in the United States, Mexico, Cuba, Porto Rico, Hawaii or the Philippines; in Canada, $4.00; foreign, $5.00—Single Copies, 10 cents

Contents of This Issue

CENTRAL GAS APPLIANCE TESTING LABORATORY IDEA EMINENTLY CORRECT, AND IF PROPERLY HANDLED CAN BE MADE TO FUNCTION SUCCESSFULLY FROM THE START—BY H. M. RILEY 385

OIL GAS A POSSIBLE "WAY OUT," EVEN WITH EASTERN GAS COMPANIES 387

LABOR MUST RETURN TO A PRE-WAR BASIS OF PRODUCTION, EVEN THOUGH WAGES WILL NEVER AGAIN STRIKE LEVEL HITHERTO DEEMED NORMAL—BY WALTER A. FAIRSERVIS..... 391

SEVENTY-FIVE PER CENT OF GALVANIZING IN CHICAGO DONE BY GAS 393

USE OF GAS IN EDUCATIONAL INSTITUTIONS..... 395

DETERMINING THE INFLUENCE OF EXCESS GAS ON FUEL CONSUMPTION IN GAS-FIRED OVEN FURNACE 397

EDITORIALS 399

MERCHANDISING GAS 405

MAKES STRONG CASE FOR GAS FOR CORE BAKING.. 407

NEWS OF THE GAS INDUSTRY..... 410

PERSONAL NOTES 415

As the Journal Views It

Another Convention

It is hardly conceivable that there could be a convention of men in any calling that would not return in inspiration, suggestion, counsel and advice a benefit whose value must by far transcend any expense in money and time the individual would be put to to attend.

When a convention is deliberately planned; when a certain basic benefit and value is assured and what may be termed the spontaneous or accidental benefit from chance exchange of human thoughts is a sort of an extra dividend, the return to the individual cannot even be reckoned.

Such a convention is that for which gas men are now gathering.

It is ambitious beyond any the gas industry has ever known.

It has been planned with an elaboration that at any time in the past would have been impossible.

It fruitifies not one year's work but all the work that has been done since the idea of the American Gas Association was ever conceived.

He who attends most and listens most intently naturally will profit most. But the least attentive and most frivolous cannot but go back to his company a better informed and more enlightened gas man than he was when he set forth on his journey to what has become the fountain-head of inspiration in the manufactured-gas field—the successive conventions of the American Gas Association.

Labor Takes a Turn

An intelligent canvass of gas company executives reveals a sudden turnabout in labor's attitude.

There is little indication of lowering wage scales. In fact, there is a question, in view of present living costs, if such is desirable. Utilities, properly supported, can and should pay a decent and even liberal scale of wages if the men will really work.

And there is much to indicate that the general run of workman in the gas field is beginning to realize that he has a responsibility toward his employer somewhat beyond that of merely checking up his bookkeeper on the contents of the pay envelope.

There are signs of a clearing on the labor horizon. Thus again is demonstrated the ability of the routine course of events to solve problems that the minds of men have feared even to venture to solve.

Getting Down to Brass Tacks

We are in for a mental readjustment; in the gas field as well as in other lines of industry.

With rapidly rising costs there is, first, a desperate effort to fight against their effects by cutting down here, eliminating a minor hitherto neglected waste there. But when all efforts fail; when, despite every curtailment, we find ourselves, by favor of new and unexpected burdens, worse off even than we were before, there comes discouragement—that spirit of "Well, I've done all I can do; the consumer has to foot up for the difference."

In the gas industry there were thorns in the way to this easy surrender to the inevitable. The automobile maker had but to reprint his price lists, the gas company to convince at least an indifferent and sometimes hostile regulatory body.

But even with us, and with good cause, the burden has been passed on.

In all industries the spirit has been manifest to a degree: "If we're on the way to ruin anyhow, what's a few dollars here or there, a few days sooner, amount to?"

Now commodity prices have commenced to tumble. The principal commodities gas companies buy seem even yet to be going the other way. But they, too, must sooner or later feel the psychology of the times. And he who watches closely will profit first.

If we have adequate rates—and few of us have—even to meet present conditions, we cannot, in honesty to the consumer, be any the less vigilant for possible economies than we would be if it were a case of "root hog or die."

Those of us who have high rates are fortunate. There is no doubt they are needed.

But all should have the aim: Lower rates at the earliest moment that conditions will justify and the reasonable financial well-being of the company will permit.

A Future for the Gas Engine

Doubtlessly due to a failure on the part of those who supply the fuel to appreciate and, hence, to properly push, gas-engine progress has been slow in this country in proportion to what might have been expected.

But reading the account of developments in the oil-shale fields, which is published in the news columns of this week's issue, one is brought to face with a new booster for the gas engine, from whom much may be expected.

Located as they will be in remote sections—sections in which water supply even will have to be dealt with with thrift—needing immense volumes of tractive and motive power, the gas engine will shine forth with unique attractiveness to the shale-oil education plants.

Gas they will have in big volume as a by-product of their process; gas, too, that must be used—or wasted—on the premises, for there will be for years, except in isolated cases, no other outlet.

It is to be expected that in the shale-oil recovery industry the gas engine will find an appreciative patron. From the association will come benefits to both, benefits in the case of the engine that may be reflected back to the older gas-producing industries.

Labor Savers

Increased applications for positions in domestic service have become manifest. There is an appreciable percentage of unemployment in this line of work.

Though of the thousands who left domestic service for work in factories, etc., but hundreds have come back as yet; though immigration has availed but little in replenishing the considerably depleted ranks of domestic workers, there are waiting lists of the unemployed.

In strange contradiction, in a time of surplus supply, this class of worker still demands an excessively high scale of compensation. This has been a factor in keeping down demand.

But the big factor has been the restriction that has come in the employers' ideas as to what constitutes an adequately manned household. One servant as a rule is now deemed enough where before two were considered necessary.

Labor-saving devices in the home have been a big factor in effecting this revised viewpoint. There is no less work to be done, but it is done with fewer hands.

The big four in this class of equipment are the vacuum sweeper, the dish-washing machine, the clothes washer and the ironing machine or mangle.

Three out of four, though deemed electric appliances, if we got down to fine points would possibly

be found to make for even greater consumption of gas than they do of electricity.

The ironing machine is almost of necessity, where gas is available, a desirable gas consumer.

Where the dish washer and clothes washer are in use, water heating by electricity becomes almost an absurdity and water heating via the water back on the kitchen range is a most unsatisfactory service. Gas water heating stands out predominant in economy and in convenience.

As a public-spirited citizen the gas man should view the rapid introduction of labor-saving devices in the home with appreciative approval. As a gas man he should be actually jubilant. Our electric brethren are putting onto our lines a considerable business that in point of desirability we have never excelled even from our own efforts.

Central Gas Appliance Testing Laboratory Idea Eminently Correct and if Properly Handled Can Be Made to Function Successfully From the Start.

(*Continued from page* 386.)

Offhand it will probably be counted an elementary problem to logically and conveniently locate and install the above-mentioned equipment. As a matter of fact, however, such is not the case. It is true, it is not insoluble, but the problem is worthy of some good thinking and should be threshed out with a view to the future. One does not put it too strongly when he says that we all abominate changes, particularly when such are the outgrowth of faulty original work. Additions are necessary from time to time, but all things being equal, it is miserable to have to do a lot of tearing down of work that should be rather permanent, in order to effect some trifling, inexpensive extensions. Such a method of doing the work in question nearly always leads to a hopeless, crazy-quilt conglomeration of piping and what not. Take a little more time, use a little more material at the start and, above all things, do not stint at a little additional expenditure of money, and the job will pay for itself many times over. Don't leave it to the boss pipe fitter and plumber to solve your problem. He knows nothing of laboratory work and almost certainly with his bright ideas will bedevil you with an outlay fearfully and wonderfully made. Give him his instructions complete to the last word and see to it that his ideas are focused chiefly on the wrench and the lead pot. The above might seem like a useless discourse on a very simple matter, but the writer has gone through the throes of the pitfalls mentioned and feels in a position to advise more or less unqualifiedly on the subject.

We should show good judgment particularly in choosing the proper meters, both as regards accuracy and capacity. As to the largest meter to be used, it would seem desirable to have at least one of a capacity of about 400 cu. ft. per hour. This will adequately take care of tests on the large gas-consuming appliances, such as house-heating furnaces, steam boilers and small industrial installations. In this connection, it is quite unsatisfactory in testing large appliances to have to resort to the ordinary large dry meter which at once depreciates the accuracy of the test. Again we might apply the admonition, "better too large than too small." Obviously, there should be a number of smaller capacity meters—say, two at a capacity of 200 cu. ft. per hour, two at 100, and two small ones at, say, 30 cu. ft. per hour. These capacities are of course based on the standard allowable drop through the meter. As regards the balance, pyrometers and the like, choice should be made from the best grades.

Any special, "to order," testing apparatus should be carefully designed with the idea of accuracy uppermost and then should be built by a reputable machine shop or instrument maker. As an example, don't construct a mantle bumping machine out of a broom handle, a discarded tomato can and a well-worn rubber heel. Along the same line, don't cull in a lot of near-junk piping from the various gas companies in order to save a few dollars on the piping bill.

A word as to the electrical equipment. This, in a small way, should be fairly complete and should include a wattmeter, voltmeter, ammeter, rheostat, small motor, switches and the like. This outlay will take care of any electrical testing that will come up from time to time. For instance, it might be found advisable to check up certain claims made relative to the operation of electric ranges, electric flat irons, toasters, percolators, etc. Also some few appliances have the combination principle such as washing machines and dishwashers. Likewise, any photometric work will more than likely require at odd times certain electrical measurements.

In concluding this portion of the article, the writer would refer the reader to the Oct. 27, 1917, issue of the AMERICAN GAS ENGINEERING JOURNAL, feeling that it might fit in well with the few high spots indicated herein.

PROBABLE AMOUNT OF WORK

With the large number of new appliances and fixtures coming out each year, it would be fairly difficult to forecast even the amount of regular work that would have to be handled in a year's time. The Baltimore Company's laboratory which does fairly comprehensive work usually handles in round figures about the following amount of work in this space of time:

30 Ranges.
20 Water heaters.
20 Space heaters.
10 House-heating devices.
70 Miscellaneous.

Certainly, then, the central testing laboratory would handle two or three times this amount of testing. Then, too, the special tests, relatively speaking, consume an enormous amount of time. As an example, the writer recollects a test on one range top burner for efficiency at various gas pressures, heights of utensil above same, varying consumptions of gas, etc., which occupied two men's time for upwards of two months and then had to be left as unfinished business. Also, if it is the intention of the laboratory to develop new appliances and burners, it would not seem unreasonable to assume that two or three men could find continual occupation in this direction.

When we consider the number of times the heating value of the gas would have to be run together, with the analysis of the same and the products of combustion, we can easily suppose that one or two men would be kept rather busy just handling this portion of the work.

All told, a rough draft of the forces might be as follows:

Laboratory chief.
Assistant laboratory chief.
2 Gas chemists.
3 Research engineers.
4 Appliance testers.
2 Clerks.
3 Utility men.

Research Work

A very important feature of the central testing laboratory should be its research work, and this phase certainly opens up wide vistas disclosing vast possibilities for broadening the gas utilization field. The subject of burner investigation and development is in itself extremely interesting and important and at the same time one that can certainly stand an amazing amount of research work. Such a line of investigation should cause us to look hopefully toward the time when we will have burners so designed that backfiring will be almost a total stranger, so far as complaint work is concerned.

Also the correct ideas concerning fireless cooking will no doubt be threshed out to a successful solution and once this matter is carried to an efficient conclusion we can laugh at any thought of the electric range making any steady headway in the average household, except of course for certain isolated localities. There is much to be desired relative to the fireless cooker principally in the gas range and with some careful investigating this can be consummated to the last letter.

Then, too, the proper kinds of metals and materials to be used in the various appliances in order to minimize corrosion, properly conserve and distribute heat and the like, is of quite considerable importance. Especially will this work have a bearing on house-heating furnaces when we speculate on some pipe and flue troubles, corrosion, etc.

The matter of the proper radiation of heat offers prime prospects even though there are some high-grade space heaters on the market which convert a goodly percentage of the thermal value of the gas into radiant heat. Together with this item we might include ventilation through the medium of gas. Without a question, we must develop a small portable gas heater along radiant lines for use in bath and other small rooms to compete with and surpass the present electric radiant heaters.

Along the research work line we might briefly mention such items for consideration, as base board and other connections, tubing, keys and cocks, gas irons, miscellaneous fixtures, industrial devices and others quite numerous. When considering this particular activity of the central testing laboratory, one thought must be borne well in mind, viz., that the degree of success of any research work carried on will be directly proportional to degree of whole-heartedness with which the manufacturers co-operate with the laboratory. Let us not mistake the fact that there is a world of good latent ideas generously distributed amongst the gas-appliance manufacturers of this country. If these are liberally contributed to the general cause a vast amount of common good will accrue thereto. This general pooling of ideas will in no wise socialize the gas appliance manufacturing business but rather will spur on ingenuity on the part of the manufacturer and we shall see more real worth-while patents in this field than ever before. Certainly once we have a central testing laboratory functioning smoothly along research lines many of our present worries about electrical competition, department-store merchandising, customers' complaints and so on, will be almost of a negative nature.

Routing and Division of Work

The proper and efficient scheduling of the entire work of the laboratory except for a few high spots requires only a few brief comments in this article. That is the men in charge of the laboratory will, according to conditions, soon be able to map out a first-class method of procedure in this regard. It would probably be a better scheme to subdivide the laboratory forces into several departments, placing those men on research work whose natural bent seemed to run in this direction and on the regular work those whose inclinations lay along the line of speed in turning out the work. Likewise, certain men will do their best work when making flue analyses, sampling, running the calorimeter, weighing, etc. In other words, since accuracy is the paramount object of the laboratory, no undue pains should be taken to make all around versatile workers.

Some Points to be Considered in Establishing Central Laboratory

It might be well at this point to consider some of the arguments pro and con that would logically arise upon establishing a central testing laboratory.

In the first place, let us consider the special testing work which is done in some laboratories for the engineering department exclusively, and which might include a wide variety of work. For example, the laboratory might be called upon to fully test out gas bags for main and service work, meter diaphragms, pipe deposits of various sorts, tools and what not. Obviously, then, this phase of the work constitutes a very important increment of the whole and we might very properly ask where this work would be carried on if the company laboratory were abandoned and at the same time if the central testing laboratory did not contemplate handling the same. There are several solutions to this problem, to wit, it might be found feasible for the central laboratory to handle the work or the local company could take care of some of it at the works laboratory or, lastly, it could be encompassed by the particular company establishing a materials-testing laboratory. And right here let it be said that the time is overripe for the larger companies establishing laboratories for testing the various materials that they purchase throughout the year. Think of companies buying thousands of dollars' worth of materials each year and maintaining but little or no check on the quality of the same. Why not test the coal, jute, solder, pipe, and the like, at one central point, instead of doing one part here, one there, some half-heartedly and some not at all. Incidentally, it would seem that such a laboratory should report to the same head as the purchasing department. In any event, the special engineering tests should by all means be carried on at some place or another.

Another contention that might be raised is that there is a wide difference in the physical and chemical make-up of the gas as made in the various plants throughout

the country, and, therefore, since the central laboratory would have to use exclusively the gas of the city in which it is to be located the results might not hold good for many other localities. In this regard, there are numerous appliances whose successful operation would be but little affected by reasonable differences in the makeup of the particular gas. However, on the other hand, some appliances will work satisfactorily in one city and will not work at all in another, unless more or less radically changed in its design. Of the first class we might mention the gas-fired house-heating furnace, luminous space heaters and the like, while of the latter might be noted gas irons, lighting units, etc. In this direction, if a gas-fired house-heating furnace were tested, say, in Chicago and found to be 75 per cent thermally efficient and later tested in Boston in identically the same manner, we should reasonably expect to derive a figure of at or about 75 per cent in the latter city. On the other hand, a certain gas iron might test out admirably in Chicago and might be a total failure in Boston, unless changed radically as regards mixer, burner, etc. There, then, one might contend, arises a serious objection to establishing and locating the laboratory in one particular place. Now it would seem like "Carrying coals to Newcastle" to have a central laboratory and in the case of certain tests transporting the appliances to the various cities for observation as to performance. But if it is a fact that such a condition would arise only in the case of small-consumption appliances it would not be an outrageous assumption in assuming the laboratory could have prepared cylinders Co^2, Co, O^2, N^2, etc., and thereby synthetically build up a gas corresponding fairly accurately to the gas in any given locality. Once such a routine were gotten in hand it should be a fairly easy proposition to duplicate any desired gas, particularly if only relatively small quantities of the same were desired for purposes of test.

One strong argument in favor of the central testing laboratory hinges on the fact that, on the average, the present individual gas company appliance laboratories are not fully and properly equipped, both as regards the men handling the work and the apparatus and testing paraphernalia. In addition, the testing routine and methods are somewhat different, which undoubtedly lead to different results and interpretations. In most cases companies have not seen their way clear to offer sufficient financial compensation in order to attract the proper and desired men to the laboratory. This condition, while not serious in so far as the ordinary "garden variety" of testing work is concerned, certainly places restrictions and limitations on research and development work and testing works of a more difficult nature. Indeed such a condition requires a rather liberal stretching of the imagination in order to evenly apply the old adage that a "half a loaf is better than none." As far as the physical equipment is concerned there is also a natural and excusable tendency to lean too strongly on home-made testing apparatus. In this respect we can hardly blame a company for not spending several hundred dollars in having a piece of equipment built for a test which might only come up again after an interval of a year or more. Nevertheless, home-made equipment makes for inaccuracy.

Another objection to the company appliance testing laboratory is that there is of necessity considerable irregularly in the work coming in to be handled, so that it is a case of either a great glut of appliances to be gone over or else virtually none. This in turn reflects directly on the laboratory men in that they are either hustling tolerably lively or else almost entirely unoccupied. It goes without saying that this latter phase represents an extremely undesirable condition. The writer has reason to feel that with a central testing laboratory the schedule of work could be so arranged that the slack periods would be reduced to a negligible quantity.

Another lopsided as well as inconsistent feature of some of our present appliance-testing laboratories is that they report to some particular department which has a special interest in the findings of the laboratory concerning the appliances' performance. This department is generally the engineering one and the idea would seem to be dead wrong. The appliance laboratory should constitute a separate department in itself, reporting its findings to and consulting with both the engineering and merchandising departments. If the laboratory is part and parcel of either of these two its findings will as a natural consequence be tinged with a certain bias. That is, the engineering department will naturally look with chagrin on appliances that might give rise to complaint on the part of the customer and more or less ignore the probable sales and attendant profits on the same. Vice versa, the merchandising department will incline toward the volume of sales aspect and give smaller consideration to the complaints that might crop up. After all the argument is taken care of in stating that those appliances should be approved for sale which in he final analysis make for the general financial gain of the company at large. To-day, there is a tendency toward too much conservatism on the part of company laboratories passing on appliances—too much microscopic searching after 100 per cent fool-proof gas devices until the manufacturer it would seem is in dire need of a philosopher's stone in order to have his product pass muster. A little liberality is necessary, otherwise the man bringing out a new device has indeed a rocky road to travel. Can it be that this condition is engendered by a lack of mechanical, and gas engineering information and education on the part of the laboratory which as a consequence gives rise to the idea of straddling and playing safe? There is no man-made mechanism, however well constructed, that will not show a certain percentage of rejects. The central testing laboratory, if intelligently and conscientiously administered, will take care of and temper any such conservative tendencies.

Conclusions

The point as to where the central testing laboratory should be located geographically is quite an important one and there are a number of cities in the eastern part of the country each of which could be regarded as a first-class choice. As far as the East is concerned, New York by reason of its cosmopolitan aspect in all lines as well as its being the headquarters of the American Gas Association, is admirably suited for locating the laboratory. Philadelphia is also a very good location, as is Washington, D. C. The fact that the Bureau of Standards is located in Washington is a very good point in favor of this city. In the Middle West, Chicago offers excellent possibilities.

The financing of the central testing laboratory should not be at all a difficult matter; in fact, it would not be an outlandish estimate in assuming that the individual company appliance laboratories in the aggregate spend nearly as much as the centrals budget would be. Over and above this, when we consider the number of gas companies in this country that would contribute in part

to the financial upkeep of this project, it is easy to see that the matter of financing the same is assured from the start. The method of financing also should be an elementary one for those qualified to handle this work.

Certainly the data and information to be handed out by the central testing laboratory will be of inestimable value particularly to the smaller companies who now largely have to either depend on information from the large companies or else at times must depend on the glib oratory of some salesman who has never seen the inside of a gas works and who sells his product on the basis of its veneer solely. Also any arguments as to whether a certain appliance has been tested properly will be settled once and for all.

Briefly, the idea is eminently correct, and if placed in the hands of a small committee of hustling, brainy members, it can be put across in jig time and will successfully function immediately.

Seventy-Five Per Cent of Galvanizing in Chicago Done by Gas.

(*Continued from page* 394.)

The following points of superiority of gas over coke were suggested by the galvanizer operating the above described plant:

Uniformity of Heat and Increased Life of Kettles

Perhaps the greatest advantage of using gas over coke is that it greatly increases the life of the kettles by eliminating hot spots. The average life of a galvanizing kettle at this plant was from six to eight months with coke. The gas-fired kettles have been in operation up to the present time for two years, and show no signs of deterioration.

Increased Production

No running time is lost in firing. This makes it possible to operate twenty-four hours a day if necessary. Gas gives a steady and continuous flow of fuel, and after the burners are once lighted it is not necessary to stop work as with coke to tear up the flooring, rake out the ashes, poke down the fire, and refire with coke. With production at a premium as it is to-day, this advantage is readily appreciated.

Elimination of Fuel Storage

With the old method (coke) in use, it was necessary to keep a good supply of fuel on hand. This takes space, and dead storage space is to be reckoned with to-day. There is no galvanizer with a coke storage room that could not use that space for a far better and more profitable purpose. Gas on the other hand entails no storage whatsoever.

Ease of Operation

The handling of high pressure gas, *i. e.*, ten pounds, is an extremely simple matter, the burners being regulated by a single adjustment. This permits a better temperature control than any other method of heating the kettle, and good temperature control is of great importance, as it affects both the quality of the work and the cost of doing it.

Clean Shop and No Fumes

A gas equipped plant means better working conditions for employees, keeps the shop cooler, cleaner, and does away with much confusion. Workmen do better work and are more contented with such surroundings.

Availability and Supply of Fuel

Gas can be secured in any quantity desired by the mere turning of a valve, and the concern using gas may be certain that as much as is desired will be available at any time without effort upon their part. This cannot be said of any other fuel, supply being frequently problematical. Even in normal times attention is required to see that a sufficient supply is kept on hand and contracted for.

Constant Composition and Calorific Value of Fuel

The variation in composition and calorific value of gas is practically negligible, whereas quite the reverse is true for crude fuels. Variation is always troublesome and results in decreased production.

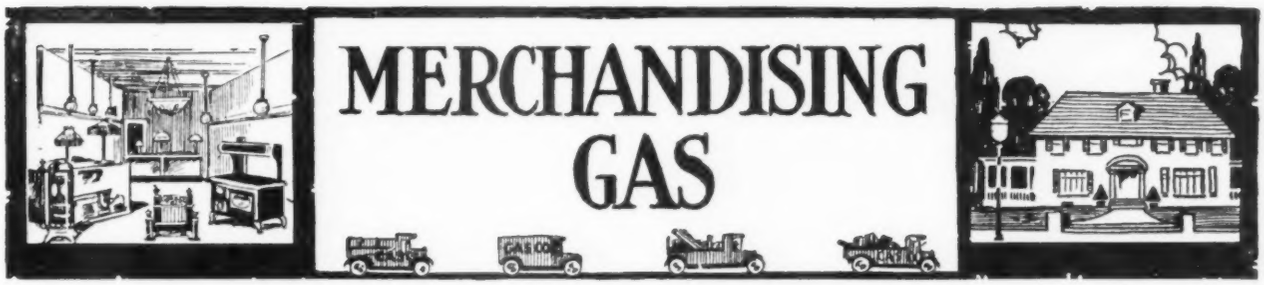
Service

This advantage is listed with particular reference to gas as fuel, inasmuch as the company supplying same is prepared to render service at all times, whereas no such condition exists in reference to any other fuel.

In conclusion your attention should again be directed to the great benefit this new method of heating with gas is bringing to galvanizing and similar industries who are progressive enough to adopt it.

Gas from Vegetable Waste

Various schemes have from time to time been put forward for utilizing vegetable waste for the generation of power. This problem is of particular importance in tropical countries where, generally speaking, coal or oil is scarce, but where vegetation is abundant and inexhaustible. It has been suggested that alcohol could be manufactured from this source, but even more promising is the idea of producing gas by destructive distillation in a modified form of gas producer. Experiments have been carried out in Egypt in which waste vegetable matter such as cotton stalks, leaves, twigs and branch wood have been successfully employed to yield gas, the apparatus being a producer in which anthracite was previously employed. It was necessary to devise special forms of cutting and breaking machines owing to the bulkiness of the fuel, and means had to be provided for continuously feeding the fuel and preventing wedging in the producer. A special form of step grate was used to facilitate the clearing of accumulation of ash. The gas was found to contain considerable quantities of tarry matter, which had to be removed and the gas thoroughly cleaned, after which it could be used for driving gas engines as readily as gas produced from anthracite. The gas can be successfully employed for burning under boilers or the producer can be modified to yield charcoal, which can be stored and used as required.



Novel Contests and Souvenirs of General Appeal

How the Reading of Advertisements Is Stimulated—Cash Prizes for Largest Purchases

By ERNEST A. DENCH

Free vaudeville or movie tickets are not exactly new business-increasing stimulants, but it was left to the Dillingham Company, Austin, Tex., to undertake something different along these lines. Their free ticket to the best vaudeville show in town was only available at matinees, the offer extending for one week only. The ticket was presented with all purchases above the dollar mark. While such stunts are boosted to the limit, it is rarely or never that it occurs to the store conducting the proposition to take displayed announcements in the theatrical page of the local dailies. This the Dillingham Company did. No more logical channel for giving publicity to such an event exists.

A Free Thermometer

Charles E. Cole, Portage la Prairie, Man., Canada, recently gave away to his customers some neat little house thermometers. There were no strings tied to the offer, except that none were given to children unless they carried a note for the same. If this exception were not made, all the youngsters in town would be testing the thermometers out in every mud hole and goodness knows where else. And their parents would be blissfully ignorant of Mr. Cole's thoughtfulness in this connection.

Making Sure Ads Are Ads

The People's Store, Hazleton, Pa., head each and every newspaper ad with a name-cut. To encourage people to read their announcements, each name-cut that was clipped and presented at the store for a limited time was worth $1 on every $15 worth of goods purchased.

What Was the Souvenir?

The Dana Company, Taunton, Mass., put over a sale attention-compelling stunt. On a certain Friday—the dullest day in the week—they announced that every lady entering the store would receive a souvenir, and they kept the women guessing. "We are not going to tell you 'what's what,'" they stated. "We want you to come and get one—FREE."

The "Broughtus" Fever

To stimulate business at the spring and fall openings in Charleston, S. C., it is the custom to give away souvenirs, or little presents, or offering prizes. The country customers, and especially the colored-folk, are greatly pleased by these small offerings, of little value in themselves but pleasing no doubt as something novel in the lives of those who have too much sameness. They do not regard them as gifts exactly, but as a reward for purchasing other things—necessities—at the place where they are given. In New Orleans it is called "Lagniappe," but in Charleston it is "Broughtus." The older negroes never make a purchase of flannel or tobacco without demanding "Broughtus."

There has been some speculation as to this strange but, to Charleston retailers, familiar word. To the best of belief it had its origin in the days when colored mammies, called Dahs in Charleston, took their little masters and missies to the stores to spend their pocket money, and when the purchases were made it is quite likely that the white children, acting upon suggestion, told the merchant, "You must give Dah, or Nursy, something, because she **brought us** here."

When Flowers Are Plentiful

During the summer and autumn, when cut flowers are both cheap and plentiful, they form a thoughtful little gift particularly appreciated by city dwellers. With this idea in mind, J. F. Vandrick, Kincardine, Ont., Canada, offered a flower free with every purchase of one dollar's worth of goods.

The First Anniversary

Charles Asoyuf & Co., Campbelltown, N. B., Canada, celebrated their first anniversary by offering cash prizes amounting to $45 for the largest amount of purchases made. The contest started on April 30 and concluded on June 26, on which day fell this store's first anniversary. Every time a purchase was made the customer received a cash-register receipt, on which appeared the amount and date of purchases. The customer saved these receipts and presented them at the store on June 27. In the presence of the customer the receipts were placed in an envelope, then sealed and the name and address of the customer added. The judges of the contest were several prominent local men, in no way connected with the store. The results were published in the following week's newspaper. Some catch lines run in connection with the contest were: "How would you like to save a dollar and make a dollar?" "Make your purchases earn big dividends."

The Airplane Shower

Dobyns, Hastings & Dobyns, Long Beach, Cal., put over a stunt that is still the talk of the town. The services of a local aviator were obtained to fly over the store in his machine, and while so doing he dropped 5,000 feathers. The kiddies, one afternoon after school hours, were cordially invited to join in the scramble to pick up the most feathers that fell in the vicinity of the store. The rewards were two prizes in merchandise to the youngsters gathering the largest number of feathers. When the boys and girls proudly marched in to the store with their spoils, the feathers were counted and placed in separate envelopes with the name and address of the contestant on the front. The following morning the envelopes were carefully checked and the names of the winners posted on the windows.

Story Contests for Boys

The New York Boy Shops, Inc., Brooklyn, N. Y., periodically run story contests dealing with timely subjects. In December was the time selected to write on Christmas, while January witnessed the launching of the Washington's and Lincoln's birthday contest, the youngsters being given choice of either subject Two prizes were awarded in each contest, and the successful boy and girl could choose from the following articles: Ball-bearing skates, tennis racquet, camera or self-filling fountain pen. The awards of merits were made on the age basis. It is the intention of this concern to keep the boys and girls interested in the store throughout the year, with similar contests to celebrate St. Patrick's Day, Easter, Memorial Day, Independence Day and Thanksgiving.

Prize Color Competition

The H. L. Benbough Company, San Diego, Cal., got in the good graces of the children with a prize color contest. No child could enter this contest without first of all visiting the store accompanied by his mother or father. The child's name and address were then registered, and he was presented with a book of pictures to be colored. Generous cash prizes were given for the best painted books. There was a reason for having the parent bring her child to the store, for, aside from providing the nucleus of a desirable mailing list, sometimes the mother stayed to buy.

Novel Alphabet Plan

George Russell, Santa Cruz, knows only too well the tendency of parents to have their offspring make small purchases for them which they themselves dislike. To encourage the boys and girls to go out of their way to patronize his store, Mr. Russell presented a cardboard alphabet letter to each child making a small purchase. The letter given out helped to form the following sentence: "Our goods are best."

The child was instructed to make fourteen additional small purchases until he had the letters composing the foregoing sentence. He was then presented with an 80-cent box of chocolates. No child over the age of fourteen was permitted to enter the contest.

Children as Ad Writers

The Arthur Ramage Company, Oakland, Cal., conspired to bring about a new school of advertising men. To this end the company cordially invited every grammar-school boy in Alameda County to write an ad about the store. For the best advertisement a substantial prize was awarded, the boy's age being taken into consideration. Parents were asked to encourage their sons to enter the contest, the far-reaching beneficial results of which were clearly set forth as follows:

He May "Find Himself"

Practically all failures are due to men not "finding" themselves in time. What wouldn't you give to know your son's natural leaning; to know just what he could do, enthusiastically, better than anything else? In this contest he may show himself, through his originality, to be just cut out for an advertising man—it is a profitable and respectable profession, too.

A Free Scooter

The Home Store, Dayton, Ohio, wanted every mother to spend at least five dollars at their store for one week only. And the mothers were approached in an indirect way through their children. News by the juvenile route travels fast, especially if there is a worth-while offer in connection with the same. The inducement that made every boy and girl fly home to mother with the news was the offer of a free scooter to the first five hundred mothers to make a five-dollar purchase during the week appointed.

Coaxing People Into Store

What method do you employ to coax people with retiring dispositions into your store? It is easy when they see in the window something they want, but when they want a certain article and are not certain you carry it in stock, what then? How about a window card to take care of this situation?

"An invitation to our store does not mean you have to buy." — Levittan, Brooklyn, N. Y.

"You are always welcome to look at our goods and are not urged to buy."—Heil-McClimans Company, Decatur, Ill.

"If it's in sight, it's inside." —George Wehmann, Brooklyn, N. Y.

"I'm after business. What are you after? Don't be bashful. Step inside."—Bushwick Novelty Shop, Brooklyn, N. Y.

The Super Window Card

The super window card is that which has a double meaning; in other words, there is an idea that the wording wishes to convey. This can be done in two ways—by backing up the caption with a suitable sketch, or by arranging an exhibit in the window woven around the text of the card. Both kinds of examples have been gathered, so take your pick.

The Pelican Comparison

A card in a Wheeling, Ohio, show window was captioned, "A Little Money on a Big Bill." The card was illustrated by a pelican balancing a silver dollar on his big bill.

The Winning "Partner"

The Great White Way, New York City, displayed a novel showcard that contained a sketch at the side of a bodyless fist clenching a

(*Continued on page* 416.)

Makes Strong Case for Gas for Core Baking

A. A. Shuetz Demonstrates Beyond a Reasonable Doubt that Best Fuel for a Purpose Is Not Always the Cheapest

In the past core baking was generally accomplished in some out-of-way corner of the foundry and little attention was paid to efficiency, economy or cleanliness. During the last four or five years, however, a great change has taken place in all foundry equipment, and the core room and its equipment has received due consideration with the result that the up-to-date foundry man is making his cores in a separate building large and well ventilated and illuminated. The advent of female labor and the enforcing of sanitary regulations have made these changes necessary and the foundries are now eager to adopt any methods which will help them in producing an up-to-date plant, and gas for core baking can be made a valuable aid, for it allows the enforcing of cleanliness and sanitation, declares A. A. Schuetz, in a paper prepared for the annual convention of the American Gas Association.

Aside from the above advantages there is another point in favor of gas fuel, and since the same means dollars and cents to the manufacturer his attention can readily be commanded. Since gas heat can be made flexible and easily controlled, uniform results can be obtained, and this is the keynote in properly baking cores. If it is kept in mind that the core is a part of the mold it can readily be appreciated that in order to produce a good casting it is essential that the core be properly made. Imagine the loss resulting when a casting is rejected. It means that all the foundry labor incurred in producing the finished mold is lost as well as the proportionate part of the labor and fuel in melting the metal, and in the core room the labor, material and heat for making the cores must be charged up as a loss. One can readily see, therefore, that the core must receive due consideration, and since much of the core's usefulness depends upon proper baking, this part of the production must not be overlooked.

Composition of Cores

Cores, as you all know, are made by mixing sand with various so-called core oils or compounds. After the cores are molded to the desired shape they are placed in ovens for baking. In the baking process a distillation of the oils takes place, leaving a hard gummy substance which firmly binds the sand grains. It is evident that any temperature employed must be sufficiently high to vaporize the oils but still not high enough to burn the residue. The temperature usually employed ranges from about 300 to 600 deg. Fahr., depending upon the kind of cores and the grade of core compound used.

Three Practical Size Ovens

The ovens employed vary in size from small shelf and rack affairs to large room-like bake ovens as long as sixty feet in which the cores are baked on cars. The designs and construction of these ovens vary from crude home-made affairs to commercially-built ovens of elaborate construction. Until very recently, however, little attention was paid by foundry men to employing efficient and labor-saving ovens. There is still in existence a great many ovens of poor workmanship and design, and it is the writer's endeavor in this paper to call attention to the essential features which must be considered in designing an oven which will be both economical and practical.

Let us consider the average gray iron foundry doing jobbing work. Here the cores will vary in size from small pencil-like affairs to large cores weighing a ton or more. Considerable study must be made in designing ovens for the various sizes of cores, for it is obvious that both time and fuel are lost in baking small cores and large cores in the same oven, for the small core requires far less time due to its smaller cross section, and the baking process cannot be forced by adding more heat above a certain point for the cores will merely be burnt. The first consideration, therefore, is to design ovens according to the size of the cores and it is the writer's experience that three sizes of ovens will generally cover all requirements. In conjunction with these three sizes must also be considered the handling of the cores in loading and unloading the oven, for it is obvious that the heavier cores must be handled with a crane while the smaller cores can be hand loaded.

Large Core Ovens

Let us consider now the drying of large cores. This is generally accomplished in large brick ovens in which the cores are placed on a car having removable racks arranged so that the work can be placed on the car in tiers by a crane. These ovens are generally coke-fired from a furnace pit below the floor level of the oven and since considerable money is represented in the oven, the gas company is usually asked to convert the existing installation. This can readily be accomplished if the walls and doors are tight.

Burners for Core Ovens

In determining the burner consumption required, the writer has found from experience that about four cubic feet of gas are required per cubic foot of volume in the oven, and that from three to four hours' firing is necessary, depending upon the temperature desired, a shorter period naturally giving a higher temperarture (other things being equal), as the burner consumption per hour will be greater.

Importance of Proper Ventilation of Core Ovens

Outside of supplying the necessary amount of heat for volatilizing the oils and driving off any moisture, there is one more factor which has received far too little attention; and that is ventilation, for it is absolutely essential that the vapors must be carried out of the oven. Occasionally one will find a coke-fired oven equipped with off-take flues at one end of the oven, generally arranged in pairs, one pair at top of the oven end one near the floor. This arrangement is all right if the principle of core baking is understood by the operator but this generally is not the case, and is not unusual to find an oven of this kind with the inside wells completely covered with a flaky, oily substance highly inflammable and frequently causing fires. This deposit means that the lower pair of vents have been used, making the oven operate on the so-called down draft system. Let us consider what happens in a case of this kind. As

heat is applied to the cores the oil is volatilized and moisture driven off and is absorbed by the air in the oven which in heating, rises to the top, causing convection currents. As more and more fumes are driven off, the air finally becomes saturated and can hold no more and some of the fumes touching the cooler walls are precipitated out. As the heating goes on an increased pressure is set up, which also increases precipitation.

This method of drying always reminds me of the absurdity of trying to dry a wet sponge in an inverted glass held over a fire. It sure is a slow process. Occasionally, however, with an oven of this construction the remark is made that poor results are obtained when the upper take-offs are used, but inquiry reveals the fact that these drafts were left open during the entire heating period. This, of course, is wrong, for the openings should be gradually lessened as the baking goes along, for the amount of products driven off get less towards the end of the heat.

The ideal arrangement would be an automatic controlling system in which only saturated products would be allowed to leave the oven, but as this is a more or less impractical proposition, hand control must be resorted to. In gas-fired ovens good results have been obtained by installing several large vents in the roof of the oven, each fitted with a damper. These dampers, however, must not be allowed to seat completely while the burners are on, for enough opening must be left to allow for the escape of the products of combustion, for if this is not done the burners will cease to operate properly and may choke entirely with possibly a disastrous effect.

At the start of the drying process one can easily notice the moisture being emitted but this becomes less as the heating process goes on. It is well to attach a chain control to the dampers extending to the side of the oven and have the same equipped with a marker of some kind so that the operator can at all times readily see the position of the dampers. After the burners are turned off, however, the dampers must be closed entirely so as to allow the residual heat left in the oven to thoroughly penetrate the cores and with a well-built oven the temperature will drop very slowly. These ovens are usually loaded during the day and heated early in the evening, the charge remaining in the oven until morning.

Medium Size Core Ovens

Medium sized cores can best be handled in small car type ovens, the same being so constructed that one carload is baking while another car is being loaded. This can readily be accomplished by having doors at either end of the oven and tracks extending through, allowing one car to be pulled out at one end and another car pushed in from the other end. These ovens can be built out of sheet iron and structural steel approximately eight feet long, seven feet high, and five feet wide, and being a fairly small appliance, they can readily be moved should occasion demand it. Since the cores are of medium size, the time of drying can be shortened considerably and it is not necessary to leave them stand in the oven for any length of time as is the case for large cores. Under these conditions it is possible to dry three to four carloads of cores per day, the last load entering the oven shortly before quitting time in the evening and the burners allowed to burn only for part of the regular heating period, there being enough heat retained in the oven to dry the cores during the night.

In the baking of small cores a different problem presents itself for there is no soaking period required as the heat penetrates to the center of the core rapidly, and very little friction is presented to the oil and moisture vapors working their way to the surface. This means that ovens of a continuous baking type can be employed and since all foundries have small cores to contend with, the field for these ovens is very large and includes practically all foundries The so-called tray or drawer type oven is very desirable for this class of work and consists of a set of horizontal trays on which the cores are placed sliding into the oven compartment, the rear end of the tray having a vertical plate which closes the tray opening completely when the same is drawn out of the oven, thus preventing heat losses while the tray is being loaded. The tray openings and distances between trays are varied so that different size cores can be accommodated. Since this is a continuous baking operation, the oven being used the entire day, it is particularly desirable to guard against heat losses. A sheet-iron shell well insulated and having double side walls in which the products of combustion are carried downward to an off-take flue can be advantageously used for they can be made portable, which is a great advantage when circumstances demand a change of working arrangements in the core room. Since these ovens are fairly small (experience having demonstrated that an oven four feet wide, six feet deep, and six feeet high answers requirements) it is self-evident that in order to maintain a uniform temperature the heat must be applied at a constant rate. Both oil and coke fail in this respect. With gas, however, a uniform temperature can be maintained with ease and this fact alone should convince any foundryman that gas is the ideal fuel for core drying for it is not always the cheapest fuel that gives the best and cheapest product in the end. The writer can recall a competitive installation made some six years ago in which two gas-fired drawer type ovens were tested out against a battery of four coke-fired ovens of similar design. Coke sold at that time for $4.25 per ton and gas in this installation at 50 cents per thousand cubic feet. From the results of the test the gas company was given an order for six more ovens and at the present time not a pound of coke is used for core baking, the company having sixteen drawer type ovens in operation daily. This installation is in a malleable iron foundry where drawer type ovens can be used exclusively.

With the above outlined essential points in regard to design and with the fact in mind that core drying is a good load to carry, the large ovens being usually fired at night, off of the peak and the smaller drawer type ovens continuously during the day, every gas company should strive to cover its territory and place core baking alongside of the many other uses for which gas forms an ideal fuel.

Determining the Influence of Excess Gas on Fuel Consumption in Gas-Fired Oven Furnace.

(*Continued from page* 398.)

would give a little more than 50 per cent excess gas, we could burn 1,000 cu. ft. or more gas in the furnace without increasing its temperature over 2,500 deg. Fahr. Still further increase in richness of mixture would cut down the attainable temperature, regardless of the amount of gas used. The lowest temperature experimented with was 1,430 deg. Fahr. The curve for this temperature rises much more slowly than that for 2,500

deg. Fahr. Even as high percentage of excess gas as 160 per cent does not cause the flame temperature to approximate the furnace temperature.

Another diagram shows the effect of air to gas ratio on gas consumption in an oven furnace. On the right side of diagram the curves for excess air are plotted. The experimental data for these curves were determined by the 1919 committee. The left side shows the curves for excess gas. These curves were calculated from the curves shown on diagram. It is observed that the holding consumptions with theoretical mixture for the same temperature are different on diagram 1 from those on diagram 2. This difference is explained by the difference in operating conditions of the furnace in 1919 and 1920. In 1919, the furnace was tested in the laboratory; in 1920, in open air with occasional winds blowing on it. Greater convection losses in the open air and also a poorer lining account for the higher holding consumption of 1920.

If the furnace had been tested under exactly identical conditions, the holding consumption with theoretical mixture would have coincided and the curves for excess gas would be similar to those indicated in diagram 2. These curves were developed by interpolating from the curves in diagram 1.

Conclusion

It is established by these experiments without any doubt that the most economical way of heating a furnace is to use a correctly proportional mixture of gas and air, the "theoretical" mixture.

In practical furnace work, gas is not so much wasted by excess gas as by excess air. Excess gas in comparatively small amounts is easily visible to the furnace operator by a characteristic flame in the flue opening, but even 10 per cent excess gas at 2,500 deg. Fahr. means a wasting of 18 per cent in fuel.

Oil Gas a Possible "Way Out" Even With Eastern Gas Companies.

(*Continued from page* 390.)

oughly mixed by passing through pumps is discharged into rear section of another box. Pumps are shut down when no more lampblack can be pumped from box, and flow from flume turned in again. After several cycles of this sort the flow is finally shut off and box allowed to drain for about twelve hours, when fuel is ready for use. All material is loaded by hand into cars and hauled to boiler room. The lampblack, being thoroughly mixed with tar, makes a very good boiler fuel and drains quickly.

So much for the present status of oil-gas manufacture. What is to be the future of the oil-gas industry on the Pacific Coast?

All gas plants of the Pacific Gas & Electric Company are preparing to handle residuums of about 14 deg. Be., which have a viscosity of 2,900 Sayboldt at 130 deg. Fahr. and are not liquids at normal temperatures. Distillation of this residuum shows the following:

Gravity at 60° F., 14.1..... 0°-150° C.— 0.0%
Viscosity at 130° F., 2,893.....150°-200° C.— 0.0%
Viscosity at 200° F., 298.....200°-250° C.— 0.0%
Viscosity at 250° F., 108.....250°-300° C.—Tr. %
300°-350° C.—14.0%
350°-400° C.—49.5%
400°-dryness 22.0%
Coke—14.5%

This oil can be used in generating gas of lower B.t.u. value, provided the temperature can be maintained high enough to permit of its being pumped to generators and heated to about 250 to 260 deg. Fahr. before atomizing. Some of the smaller plants will be unable to handle this material and other oils must be provided. The larger oil companies, in order to meet gasoline and lubricating oil demands, are installing new methods of cracking which will practically leave no residuum for fuel oil, the final resultant being about 8 per cent of pitch with a melting point of about 300 deg. Fahr.

The amount of oil used for gas making on the Pacific Coast, which is not to exceed 5,000,000 barrels per year, is small compared to the amount used by railroads and other large fuel consumers. Is there not some way to be found by which gas companies can be assured of a supply of suitable oil? The average citizen rarely considers the source of his gas supply, and a campaign to educate the public in this regard would be a step in the right direction. Gas is a necessity, especially in California, and our future lies in the ability to procure the necessary amount of oil of a suitable quality for gas production.

Annual Frolic of A. G. A. on Friday, Nov. 19

The annual frolic of the American Gas Association will be held at the Glen Ridge Country Club, Glen Ridge, N. J., Friday, Nov. 19. Members will have full club privileges all day. The frolic starts at 5 A. M. and the finish will be any time after midnight. After the strenuous week at the meetings you will need a day off. There are three ways to get there. By train, Hudson Tube from Thirty-third Street to Lackawanna Station, 8.30, 9.52, 10.45, 11.52, 12.39 and 1.30. By motor, Twenty-third Street ferry to Fourteenth Street, Hoboken, or Forty-second Street ferry to Weehawken, west to Bergen County Boulevard, south to Newark Avenue, right down hill over Hackensack River, Belleville Turnpike to Washington Street, north to Central Street, top long hill, right-left over canal, right-left to Ridgewood, south to club, two blocks. By airplane, hourly service from Governors Island; fare, $1,000.

There will be golf and tennis matches. A handsome prize to be awarded to the winner of pick-your-own handicap, another to low gross score.

Price of outing, including lunch and green fees, $5. Lunch only $2 or a la carte. For any information write, phone or drop in and see the committee, Louis Stotz, M. C. Robbins, S. P. Hayward. Send in your entries to the office of the A. G. A., 130 East Fifteenth Street, New York City.

NEWS OF THE GAS INDUSTRY

Representatives of the Independent Oil Men's Convention Visit the De Beque Shale Fields

Two Hundred Miles of Shale Land Which Will Solve the Oil Problem of the Future—Wonderful Progress Noted in Number of Plants Already in Operation

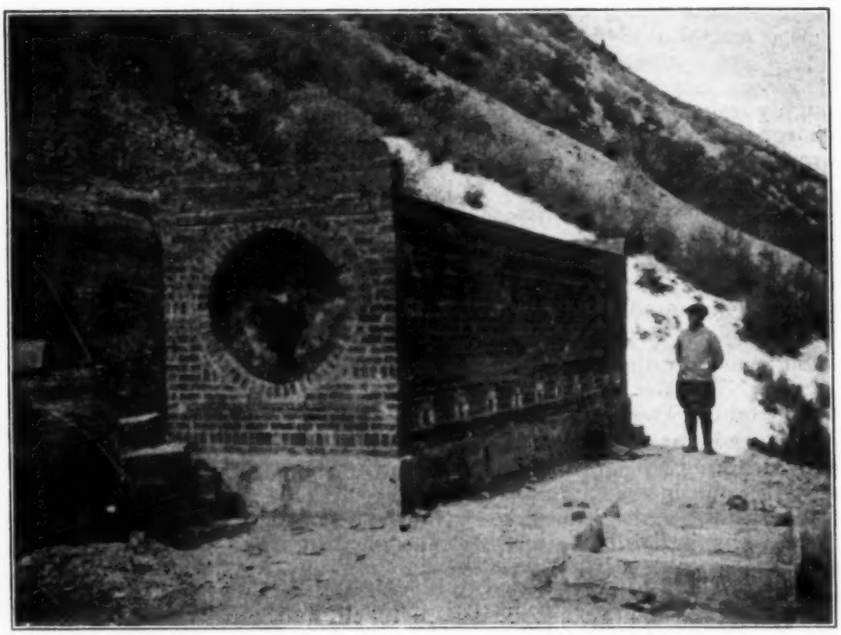
By LAWRENCE BOTHWELL

You have heard of the fabled Aladin Lamp? You remember that when this unpretentious object was rubbed by the hand genii appeared, asked what was wanted, and lo, all that mortal man desired was at the disposal of him who summoned? Have you ever heard of American ingenuity, the Alladin lamp of today, which, when touched by the hand of human necessity, nothing is impossible—yea, as by the touch of a magic wand, the wheels of commerce again revolve, and relief and happiness come to millions, because mountains of rock have been transformed into oil?

On the morning of Oct. 3, 1920, four Pullmans rolled into the quiet little town of De Beque, Col. It was an auspicious occasion for De Beque, but as expectant and interested as were the inhabitants of this little place, little did they realize that this was an event of national interest and importance, a forerunner of great activity and development in this section of the country. Representatives of the Independent Oil Men's Association, held in Denver from Sept. 28 to Oct. 1, passed the assembled spectators, few of whom knew that they were honored by such men as James Duce, State inspector of oils of Colorado, E. E. Grant, secretary of the Independent Oil Men's Association, Kirby Thomas, well-known mining engineer of New York City, Dr. Victor C. Alderson, president of the Colorado School of Mines, M. J. Gavin, representative of the United States Mining Bureau, F. A. Wadleigh, general passenger traffic manager of the Denver & Rio Grand Railroad, Hon. E. R. Harper, former Lieutenant Governor, and Hon. George Stephan, Lieutenant Governor of Colorado, and John S. McCarthy, vice-president of the Lackawanna Oil Shale Products Company, the brains and pioneers of the oil industry of the nation. The visitors walked along the main thoroughfare of the town and under a large banner stretched across the street, upon which was painted in bold letters, "Welcme to De Beque, the gateway to future oil of America.

And a "gateway" De Beque surely is, because through this modest and unassuming village is reached two hundred miles of shale escarpment which undoubtedly will solve the oil shortage of America.

The visitors were immediately taken by automobile to Mount Logan, towering above the town like a great sentinel. The top of the mountain is 8,500 ft. above sea level, and 3,500 ft. above De Beque, and is the middle of the Green River formation which is the richest part of the shale deposit. A tunnel seven feet high by twelve feet wide has been driven eighty feet into the shale beds about 600 ft. below the summit. A rotary drill, recently invented and installed by G. B. Cushman, is used successfully in the mine. It is operated by a small gasoline engine and will drill a two-inch hole four feet into the shale in about seven minutes. A tram house sixteen by twenty-four feet and twenty-four feet high is located near the mouth of the tunnel. The mined shale is received from a bulkhead into a bin and conveyed by two buckets on an aerial tram down the side of the mountain three-eighths of a mile to another station of the same dimensions where it is automatically dumped into pocket bins.



THE GINET RETORT ON THE MONARCH PROPERTY

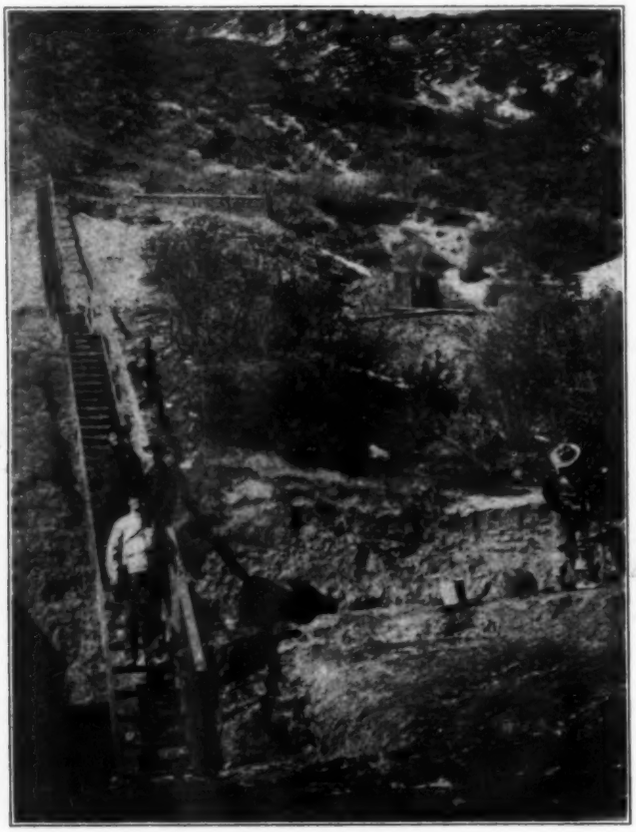
It then falls into buckets of a second part of the tram and is carried five-eighths of a mile to a jaw crusher. From here it is elevated to a grinder where it is reduced to a small mesh, when it is ready for the retort. This is of the "Simplex" type, twenty-one and one-half feet long, twenty-eight inches wide, and four inches deep, and is placed on an angle of 15 deg. from the horizontal. The burner is placed under the upper end, instead of the lower, the flue being at the lower, and the fuel is the oil made by the retort itself. Thus the shale enters where there is a high degree of heat, but the shale being cool lowers the temperature, yet becomes hot soon after it enters and carries the heat to the lower end, which tends to eualize the heat from one end to the other. The shale is forced into the upper end and forced out of the lower end by means of auger conveyors revolving in pipes four inches in diameter and two feet long, thus preventing the air from entering at either end. While the shale is passing through the retort it is continually kept in motion by seventeen agitators in the form of arms resting on the bottom along the center. These extend through stuffing boxes at the top of the retort and are keyed to a gear on a shaft extending the whole length of the retort. The gases leave by means of six-inch takeoffs at six places on the top and are carried through six-inch pipes downward along the top and into two headers, then into a sixteen-inch pipe, and from this into the condenser. This large pipe takes all the heavier oils, the lighter vapors passing through 800 ft. of eight-inch pipe which leads into a four-inch galvanized pipe arranged on the order of a condenser. The shale passes through the retort in five and one-half minutes. The retort is operated by a six-horsepower kerosene engine. This one unit will produce twelve barrels in twenty-four hours. The management stated that this unit is now complete and in commercial working order, and that they are now ready to add other units to increase the output.

Leaving the Mount Logan plant, the party traveled northward along the Roan Creek road branching off at Conn Creek to visit the Ginet plant fourteen miles from De Beque. Shortly after entering Conn Creek, the party passed near the Lackawanna Oil Shale Products Company, a corporation with main offices in Denver. Its holdings consist of 1,280 acres of shale land. The famous

A MOUNTAIN RANGE OF SHALE ON ROAN CREEK NEAR DE BEQUE

"Red Pinnacle" is a veritable mountain of shale. This company has under construction what is known as the Randall retort, the invention of J. W. Randall, a New York engineer. The retort is nearing completion in the Vulcan Iron Works of Wilkesbarre, Pa. During the war with Germany this type was used successfully in the extraction of acetone, acetic acid, and wood alcohol from products considered more gummy and difficult to handle than the oil shales of Colorado. It is 110 ft. long and weighs approximately 250,000 lb., and when in place is within a few degrees of a horizontal position. It revolves over gas burners, the gas being generated by the shale in the retort, but the heat is so regulated that the upper end where the shale enters is of a lower degree of heat than the lower end. The heat gradually increases in intensity as the shale approaches the other end until it is sufficient to educe any volatile matter that may remain. The object of this style of construction is to draw off the gases as soon as they are formed, thus preventing them coming into contact with a heat higher than necessary to produce them, and preventing vapors that can be educed at a lower temperature from mixing with those that can only be educed at higher temperatures. There is no conveyor or agitator on the inside of the cylinder, the revolution together with the incline being sufficient to convey the shale from the upper to the lower end. As soon as the gases are formed they are drawn off by means of fans. The capacity of this unit is 150 bbl. per day. Other units will be added until the capacity will be increased to 1,000 bbl. The company plans to place the plant on the south side of the Red Pinnacle on a natural ledge several hundred feet wide and about 150 ft. above the base of the mountain. This will enable them to dispose of the spent shale without difficulty by simply discharging it over the edge. An aerial tram is to be constructed from this bench to the richest beds near the top, a distance of 3,000 ft.

To the right of the Lackawanna property is that of the Anglo-American Shale & Refining Company, a company recently formed under the laws of Colorado, with a capitalization of $2,500,000, and whose holdings consist of 960 acres of shale. The highest point on its property is 9,000 ft. above sea level. Being a part of the "Book Cliffs," along the Grand River, this elevation is an advantage because the middle of the Green River formation is found on the tops of these mountains. Shale taken from the strata in the overburden of this property has tested as high as three and one-half barrels of oil to the ton. The holdings are at the head of Baudish Gulch, which is a short tributary of Conn Creek, and on an air line is four miles from the Denver & Rio Grand Railroad. The property is so located that there is a gradual rise of 2,000 ft. between



STAIRWAY LEADING TO THE RETORT ON THE MONARCH PROPERTY

the Conn Creek road and the property line, a distance of two and one-half miles. When the road is completed a machine may easily climb to the escarpment. A force of men is employed constructing a roadway and preparing a plant site for the erection of a retort, probably of the Randall type. The company announces that it now looks as though the plant will be in operation by the first of the year.

Immediately north of the Red Pinnacle, and across Baker's Canyon, is the property of the American Shale Refining Company with holdings consisting of about 4,000 acres. Three good sized bunk houses have been constructed on the right of the road and near the base of the mountain. Excavations have been made for the retort, and an aerial tram has been completed. The cables are supported on six towers extending northward up to the shale beds 2,000 ft. above the creek. Parts of the retort are already on the ground, the remainder being in the railroad yards at De Beque ready to be hauled out to the site. This retort is the Wingate type, a verticle cylinder made of iron, and divided into eight compartments with takeoffs leading from the sides of every other compartment connecting with a pipe that conveys the gases to a condenser. Two large hoppers are placed on top of the retort where the crushed shale feeds into the chambers below. One unit is about forty feet high and six feet across, and has a capacity of 150 tons daily.

The northern terminus of the routing of the party was the property of the Monarch Shale Oil Company. Its holdings are on the left of Conn Creek. A large, two-story bunk house came into view some 200 ft. above the creek. After making a slight detour to effect a crossing, the party found an excellent roadway leading to the plant. A mammoth truck was standing near by. On entering the building a large double fireplace occupied the center of a long room. Shale was used for heat and made a fine, smokeless fire. The upper story is heated by means of the pipes of the fireplace. To the right of the building was the foot of a long stairway which the party began to climb. After several flights up the side of the mountain the visitors found one unit of a retort practically completed. It is the invention of J. H. Ginet, and was perfected and tested at Golden, Col., where the School of Mines is located, and has been tested under the supervision of prominent engineers. The unit installed on the property is practically the same dimensions as that tested at the Colorado School of Mines. It consists of a number of iron sections of a cylinder bolted together. Thus bolted together the present cylinder is about forty feet long and three and one-half feet in diameter. This retort does not revolve, but remains stationary, and is heated by means of oil and gas generated by the retort. The shale enters the retort after having been reduced to one-half inch mesh, and is taken through the cylinder by means of a system of agitators or flanges pointing slightly to the further end. These flanges project from a shaft extending through the whole length of the cylinder. The vapors escape through a row of takeoffs along the top and are conveyed through pipes to a condenser. The theory of the working of this retort is that it takes off the gases in their natural sequence and before any secondary decomposition. The capacity of the unit is fifty to sixty tons of shale, which means, with the shale at their command, seventy to eighty barrels a day. A 9,000-lb. Sturtevant crusher is on the ground. Also three gas engines, one of which is in place, operating a surface tram with a wire cable 2,300 ft. long. A conveyor pipe four inches in diameter and 2,200 ft. long is also on the ground ready to be placed between the retort near the base of the mountain and the crusher near the top. This will convey the shale, crushed to a half-inch mesh, to the retort by gravitation. All the material for the completion of this plant has arrived and is being assembled as quickly as possible. It is expected that this one unit will be complete and producing oil steadily by the first of December of this year.

Looking east and north from the Monarch property the visitors had an excellent view of the property of the Colorado-Missouri Shale & Refining Company, a Missouri company, with a capitalization of $2,500,000. Its holdings consist of 2,240 acres of shale land, part of it being at the head of Conn Creek in the form of a mountain of shale. Being at the head of the creek and on both sides of the Conn Creek canyon, it presents a huge face of shale. A roadway has been constructed to the plant site some distance above the bed of the creek, and a trail leads

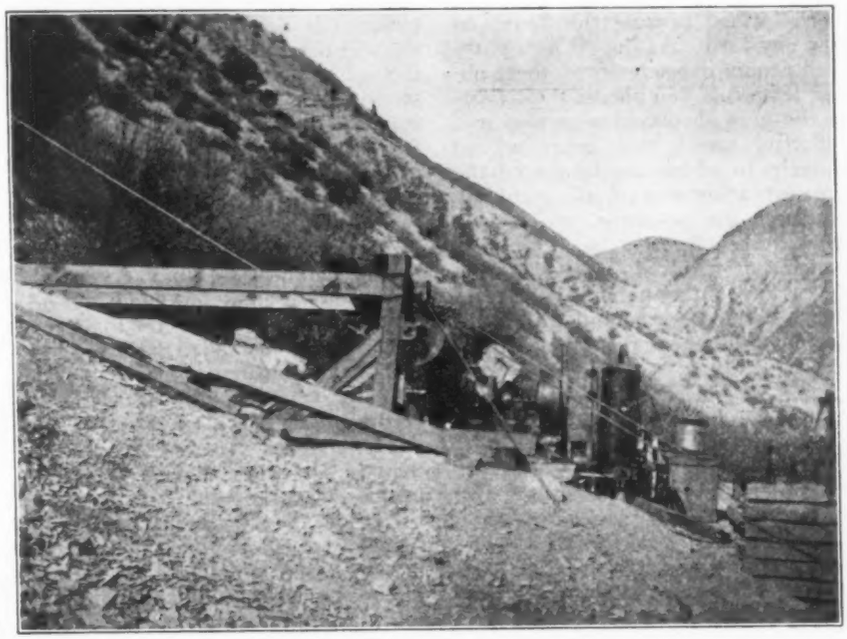
from the site to the shale beds. The company is now casting about for a retort and there seems to be every reason to believe that a plant will be in full operation by next spring.

Going back to Roan Creek and thence northwest, the party passed the holdings of several large companies. One company in particular is attracting considerable attention. It is none other than the Ventura Consolidated Oil Fields Company of California. This company is one of the big oil producers of California, and is affiliated with the Hammon Engineering Company, interested in gold dredging in many fields. This company had a large force of men employed on its holdings and is to do extensive diamond drilling this fall to prospect the 9,940 acres of oil-shale claims which it owns. The company has opened an office in De Beque, and a large amount of supplies is coming in daily. The drilling apparatus is being conveyed to the property and will be in place in a few days. The management states that the drills will be placed on top of the property and that they will go down some 600 ft. through the shale beds, producing a core about four inches in diameter.

In the distance could be seen the holdings of Doherty & Company, 60 Wall Street, New York City. This company announced in a market letter of Aug. 24, that it owns a large tract of oil-shale land near De Beque, Col. The holdings of the Westinghouse Electric Company of Pittsburgh, the Nipissing Mining Company of Canada, and the Standard Shale Products Company of San Francisco could also be seen. The party passed near the holdings of the Mount Blaine Shale Products Company. H. A. Hansen, mayor of De Beque, is manager of this company. "Mount Blaine" is one of the shale landmarks of the De Beque district. It is a huge mass of shale, a mountain, rearing its bald summit high above the surrounding country. Beyond this was the property of the Colorado Oil & Chemical Company, and on the left of the valley was the property of the Colorado Oil Shale & Refining Company and the Standard Shale Products Company in both of which S. H. McMullin, a prominent attorney on the Western Slope, is interested. These properties are known as the Kimball Top, and comprise about 9,000 acres. Farther off to the left stood the property of the Colorado Carbon Company. Geo. W. Holdredge, general manager of the Burlington, is the president of this company, and other Burlington officials are heavily interested. L. W. Leach, a high-class chemist and engineer, is in charge of the work. The properties of the Oil Shale & Shale Oil Company, a Kansas company, the Superior Shale Oil Company of Des Moines, Iowa, of which W. O. Pray is consulting engineer and is now located at De Beque, the Search Light Oil Shale Company of Denver, the United States Shale & Refining Company of Blackwell, Okla., and the Colorado Shale & Metal Company of Denver, were pointed out.

Twenty miles northwest of De Beque, on "Dry Fork," a tributary of Roan Creek, is located the plant of the Oil Shale Mining Company, the pioneer of the eduction of oil from shale. This company claims to have erected the first distillation plant in the United States. They have on the ground set up and in operation two intermittent Henderson retorts of the Scotch type. They stand sixteen feet high, twenty inches in diameter at the top and twenty-two inches at the base, and each will hold at one time one ton of shale. Each is made of cast iron one and one-half inches thick, and is in two eight-foot sections held together by flanges bolted together. The heat is supplied at the bottom, shale and the fixed gas being used. There is a runway at the top where the shale is automactically dumped into the retort. When the shale is undergoing heat the top of the retort is sealed to prevent gases escaping or air entering. The gases come off under their own pressure at several places along the side. The company is planning to install a new type known as the "Young" retort recently patented by A. V. Young. The advantage of the Young process over the present process is that it is continuous and only requires six minutes to educe the oil. The company expects to have a 100-ton unit of the Young process installed next spring and will operate it in connection with the present Scotch type. Buildings on the ground consist of a large bunk house, a cabin sixteen by thirty-two feet, and a number of smaller buildings. There is a half mile of aerial tram with seven towers supporting a one and one-half double cable with a ton bucket on each side. The shale beds are 750 ft. above the retort. There is a good automobile road to the plant. Harry Flynn, the president and general manager or the company, has been with the company since its organization, has spent years and much money in experimental work, and his findings have been given freely to the public as he went along.

This account would not be complete, there would be a feeling that something was missing, if the name of "Matt" Callahan were omitted. In 1879 a young man came from New York City to the Western Slope



MACHINERY OPERATING THE SURFACE TRAM ON THE MONARCH PROPERTY

and stopped on the Grand River near where Grand Junction is now located. This man has lived in this community since that time, has been the real pioneer in the shale industry, and has experimented with and tested the "worthless" rock on the mountains until his friends began to comment on his strange and peculiar behavior. He asked no questions and he gave no information, but he kept working away trusting that it would not be long until his hopes would be realized. It proved to be longer than he thought, but since all things come to him who perseveres and is patient, so they have come to "Matt." Standing on the street of De Beque, the visitors were seen gazing at a great mountain to the east, its summit turned to gold in the light of the setting sun shining over a valley cast in shadow. The name "Governor Shoup" was heard in connection with the company owning this magnificent portion of the great "Book Cliffs" along the Denver & Rio Grande Railroad; the names of other men of influence and wealth were heard, and last, but not least, the name of our old friend; for they were looking at the realization of his dreams—"Mount Callahan."

After the sun went down behind the shale mountains, and night settled upon a history-making convention, great piles of shale that had been built in different parts of the town were set afire. They burned fiercely, and as they burned gases were formed causing the flames to leap skyward. As the oil men gathered around these bonfires, these object lessons if you please, their faces in the glow displayed a serious and reflective mood, that sober second thought to which can be traced the greatest achievements of mankind. No critic, no pessimist, no obstacle can survive when men begin to think, which they surely do when the basic necessity of the human race, that which clothes, feeds, and warms us, begins to disappear from the earth.

Fire Destroys Power Plant

Fire destroyed the Taylorsville (Ky.) Power Plant on Nov. 1, and also a garage and blacksmith shop located in the same building. The fire began when an employee fell and upset a can of oil, which was ignited by the torch he was carrying. The loss was $15,000, with no insurance.

Samuel Insull Addresses Annual Meeting of N. E. L. A.

Nearly 300 members of the Public Service Section N. E. L. A. were present at the dinner given Oct. 25, and an equal number at the dinner on the evening following at the Hotel Morrison, Chicago. This, the annual meeting, was extended over two days because of the impracticability of releasing all the members from their duties on a single day. The program was the same each day. President Insull on each of the evenings spoke on the "Importance of Utility Company to Communities Served."

The officers of the Company were all present. Matthias Britsch, who retired on a service annuity, Nov. 1, occupied a seat at General Superintendent Lukes' table. President Insull, who was introduced by Theo Black, said in part:

"This has been a critical year for the public service company and for a great many other public utility companies." He then sketched the causes—great advances in costs of material and labor—which obliged the company to apply for the authority to increase its rates recently granted by the Public Utilities Commission. The general sentiment was now in favor of fairly remunerative rates for public utilities.

"It must be agreed that it is a very remarkable accomplishment that the electric light and gas companies of the country should have met the strain of mounting war prices for material, of vastly increased rates for labor and have been able to carry on their business and function during so trying a period, with a percentage increase in their rates which is relatively small compared with the percentage increase in every other commodity used by our company. As the time goes by and as the investing public begins to realize the great stability of our business we will reap the fruits of what we have been able to do during the period of stress."

The chances are, said Mr. Insull, that we are approaching a period of business depression.

"When all other industries are at their lowest ebb the probabilities are, based on the experience of former periods of depression, that the public utility business of the country will be in a position of absolute soundness.

"Such a period as we are approaching calls for the greatest caution in the operation of our business. The prosperity of the communities in which we operate is bound up in our prosperity.

"What we need to do," Mr. Insull continued, "is to bring home to the people the extremely serious situation in which the citizens of this State would be placed if the various great public utilities are not given the necessary protection to enable them to build up the necesary credit to obtain the necessary capital with which to develop their business. If you will take the record of a receding community so far as its prosperity is concerned you will find in the record of its public utilities the reason for its lack of development. Unless electric service is freely at the disposal of every line of business and every residence in a given territory and unless gas service is equally available it is not possible for that community to develop either from a residential, industrial or commercial point of view. No greater injury to the whole people can be done by any man in public office than to agitate for a course of action or a policy on the part of the State or the local government which means the deprivation of credit to the public utilities of this community or any other community. It need not be feared that such an agitation will succeed. Should any attempt to be made in the Legislature at Springfield next spring to follow a course that might stifle the development of the various public utilities, the Legislature will not only hear from the 300,000 investors in those enterprises but that they will hear also from the citizens of the State who above all else want a businesslike administration and proper protection not only for the entire body of citizens but for every industry public and private contributing to the wealth and prosperity of Illinois."

The old Board of Control and the newly elected one met on the first day of the annual meeting and arranged for the transfer of the affairs of the association to the control of the new-comers.

The manufacture of coal and water gas was demonstrated at a meeting of the general office section N. E. L. A. Oct. 28. The special apparatus provided for the demonstration was operated by H. H. Clark, while the processes were described by C. W. Bradley. This instructive and novel feature greatly interested the large attendance.

Personal Notes

W. B. Kopfer New Manager of Improved Appliance Co.

William B. Kopfer will succeed S. Tully Willson as general manager of the Improved Appliance Company, Brooklyn, N. Y. This change in management is the first step in enlarging the field of this company's operations.

The Improved Appliance Company has covered the industrial field pretty fully in the past, but now contemplates the manufacture of industrial furnaces for every purpose, as well as of every size, from the smallest to the largest.

William B. Kopfer is very well equipped, by training and experience, to carry out this program, being a graduate engineer of the University of Michigan and having a very broad experience in the application of oil, as well as natural and artificial gas, to industrial heating purposes.

As combustion engineer with the combustion department of Henry L. Doherty & Co. he spent several years in the Southwest natural gas and oil territory. As industrial fuel engineer and later manager of the industrial heating department of Henry L. Doherty & Co. he carried out some of the most successful pioneer developments in the application of artificial gas from an industrial standpoint. He has spent the last three years at the Henry L. Doherty Company's property in Toledo.

In addition to the above, he has also lately been connected with the Empire Ohio Chemical Company, acting as secretary and treasurer, as well as with the Atlas Chemical Company as secretary, both of which firms are engaged in the manufacture of artificial gas and its by-products.

In addition to his experience with the Atlas Chemical Company and the Empire Ohio Chemical Company, we may mention that Mr. Kopfer was born Oct. 9, 1890, at Denver, Col., and was graduated from Denver High School, East Side, 1909. He attended during 1909 and 1910 the University of Michigan, and was in the 1913 class at the University of Michigan, where he obtained the degree of bachelor of electrical engineering. Mr. Kopfer acted as test engineer for the Sperry Gyroscope Company until June 1, 1914, and was later a cadet engineer at the Denver school of Henry L. Doherty & Co. from July 1, 1914, until Jan. 2, 1916.

Following this, he was with the combustion department at Caney, Kan., up to May 7, 1917, and with the industrial heating department of Henry L. Doherty & Co. at Toledo, Ohio, from May 7, 1917, until about two months ago, when he assumed the general management of the Improved Appliance Company.

Mr. Kopfer is a member of the American Gas Association and an associate member of the American Institute of Electrical Engineers; also a member of the Toledo Section of the American Chemical Society and a member of various fraternities.

Ralph Elsman has been elected president of the Kings County Lighting Company, Brooklyn, N. Y., succeeding F. N. Tait, resigned. Mr. Elsman was formerly general manager and vice-president of the company. He is said to be the youngest public utility executive in the United States, not yet having reached his thirty-fifth birthday.

Mr. Elsman has been with the Kings County Lighting Company for the past four years, coming to Brooklyn after an extensive experience in the public utility field. He has been connected with some of the largest companies in the United States, among which might be mentioned the Pacific Gas & Electric Company. He spent nine years on the Pacific Coast, and during that time rose to be a power in the organization. He returned to the East and assumed the general managership of the Kings County Lighting Company, and during his period with the company has made it one of the model organizations in the United States.

Not only is Mr. Elsman a figure in the utility business but he also is prominent as a business man of Brooklyn and his activities, since he became a resident of that section, have been wide and varied. In the utility field Mr. Elman is a member of a great many organizations, including the American Institute of Electrical Engineers, National Electric Light Association, American Gas Association, National Red Cross Institute, and in addition is a member of the executive committee of the Empire State Gas & Electric Association and director of the Utilities Mutual Insurance Company. He also is a member of the Publicity Committee of the Empire State Gas & Electric Association.

His policy of letting the public know the exact condition in the gas company has done a great deal for the utility business and has been one of the big reasons for the changing spirit with which the public is receiving the efforts of his company to serve.

Joseph M. Riley, general manager of the Chelsea Branch of the East Boston Gas Company, has been appointed general manager of a new office and salesroom to be opened by the Massachusetts Gas Companies at Coolidge Corner, Mass.

The appointment was made by President Richards and testifies to the high esteem in which Mr. Riley is held by his superiors. The new branch includes the town of Brookline and those sections of Boston known as Brighton and Allston.

Mr. Riley started in at an early age in the electrical department of the old Chelsea Gas Light Company and for twenty-seven years he has been located in Chelsea. He has been very successful and has the confidence and respect of the company's large clientage who have always found him honorable, fair and courteous in all his dealings.

His host of friends in Chelsea wish him every success in his new position.

Novel Contests and Souvenirs of General Appeal

(*Continued from page* 406.)

deck of cards. The card was captioned, "You win if you take home one of these articles, for you save 25 cents on the dollar." This was the novel method adopted to call attention to the reduced-price lines featured in the trim.

NOT MERE TALK

Reisman, New York City, stated, "Our success is not attributed to mere talk. It is the result of our constant effort to please." The talkative parrot that adorned the side of the card was a clever way of executing the idea back of the card.

SMOOTH SAILING HERE

The New York Boy Shops, Brooklyn, N. Y., covered the middle of their window floor with white canvas, over which a model toy yacht was placed. The white canvas material was daubed here and there with patches of ocean-blue. Attached to the yacht was the following card: "Easy sailing when you shop here."

THE PROFITEER

R. R. Brant, Newark, N. J., displayed a cartoon of a bunch of people hunting the profiteer, in the form of a wolf. The wording on the cartoon pointed out, "Do not hang around here. Buy now. Compare our prices with others."

THE ANTI-NEWSPAPER ADVERTISER

Misel's, New York City, laid a dime and a bottle of ink on a pedestal in the middle of their show window. At the back of the pedestal appeared the following sign: "Newspaper advertising costs $500 per page and you have to pay for it. This ad costs 10 cents and a bottle of ink."

Rosenthal's, Brooklyn, N. Y., makes effective use of small window streamers, the announcements on which are inscribed with a blue pencil. Each streamer is captioned "Blue Pencil Talks." Two typical talks are quoted below. Sometimes the talks run to rhyme, as the two given below:

My Good Buys
Have made people say
Good-by
To the store that had its prices
too high.
Mr. Storekeeper wonders why
They all go to buy at Rosenthal's.
Step in; I'll show you why.

The second poetical effort ran as follows:

Soaring prices made us sore—
We are all looking for this store
Where prices are no more to-day
Than the day before.
This is the store.

No matter how cleverly worded the window card, if a word is spelled incorrectly the salesmanship value of same is considerably curtailed. It is only human nature to laugh over a mistake that reveals a merchant's carelessness, with the result that one thinks all the time of the error rather than the message that the card served to convey.

Columbia Gas Earnings

The consolidated earnings statement of the Columbia Gas Company, Huntington, W. Va., and subsidiary companies for September shows gross earnings for the month of $1,084,100, an increase of $207,369, or 23.65 per cent over the same month a year ago. Total net earnings, including other income, amounted to $726,894, a gain of $155,778, or 27.28 per cent. Surplus after rentals and fixed charges amounted to $302,619, an increase of $136,976, or 82.68 per cent. The improvement in earnings, which has been consistent over several months, gives good ground for believing that the dividend rate might be increased within a reasonable period of time. It is considered that a 7 per cent rate before the close of next year is not unlikely.

Employees' Association Elects Officers

The annual meeting and election of officers of the Arlington (Mass.) Gas Company Employees' Association was held last week and the following officers elected: Lawrence Bradley, president; James Haley, vice-president; Maurice Hatch, treasurer, and David Scannell, secretary.

Kings County Lighting Co. Directors Resign

Ralph Elsman Promoted to Presidency, Succeeding F. M. Tait

Four directors of the Kings County Lighting Company, Brooklyn, N. Y., have resigned. All of the directors had been subpoenaed by the Public Service Commission to appear at a hearing regarding the connecting of the distribution system of the Kings County Lighting Company with the Brooklyn Boro Gas Company so as to put it in the position to obtain the additional supply of gas it needs to meet the demand of several thousand new customers who have been unable to get the service because of the inadequacy of the company's plant.

The directors who resigned are C. K. G. Billings, George Knapp and F. M. Tait, who was president of the company, and Elton Parks.

Ralph Elsman has been promoted from vice-president and general manager to president of the company, to succeed Mr. Tait. On being questioned concerning the connection with the mains of the Boro Gas Company Mr. Elsman declared that it would be complied with, but that he had little faith in its meeting the situation.

"I know that the Boro Gas Company hasn't sufficient gas above its own needs to supply us with what we want," he declared. Mr. Elsman told Commissioner Donnelly that it had not yet been decided at what point this company would construct the "tie-in" with the Brooklyn Boro Gas Company, but that the engineers were working on the plan now. He said that the actual physical work on the connection would not be started until he had an agreement in writing with the Brooklyn Boro Gas Company as to the amount of gas the latter company was prepared to deliver to his company.

"In from six weeks to two months' time," Mr. Elsman declared, "the productive capacity of our own plant will have been enlarged. A new gas machine has been ordered and is now ready for shipment."

There are seven members on the new board of directors of the company. Andrew J. Connaud has been elected to succeed Mr. Parks and W. A. Morris to succeed Mr. Billings. Other members are Paul Bucher, W. M. Flook and Mr. Elsman. There are two vacancies.